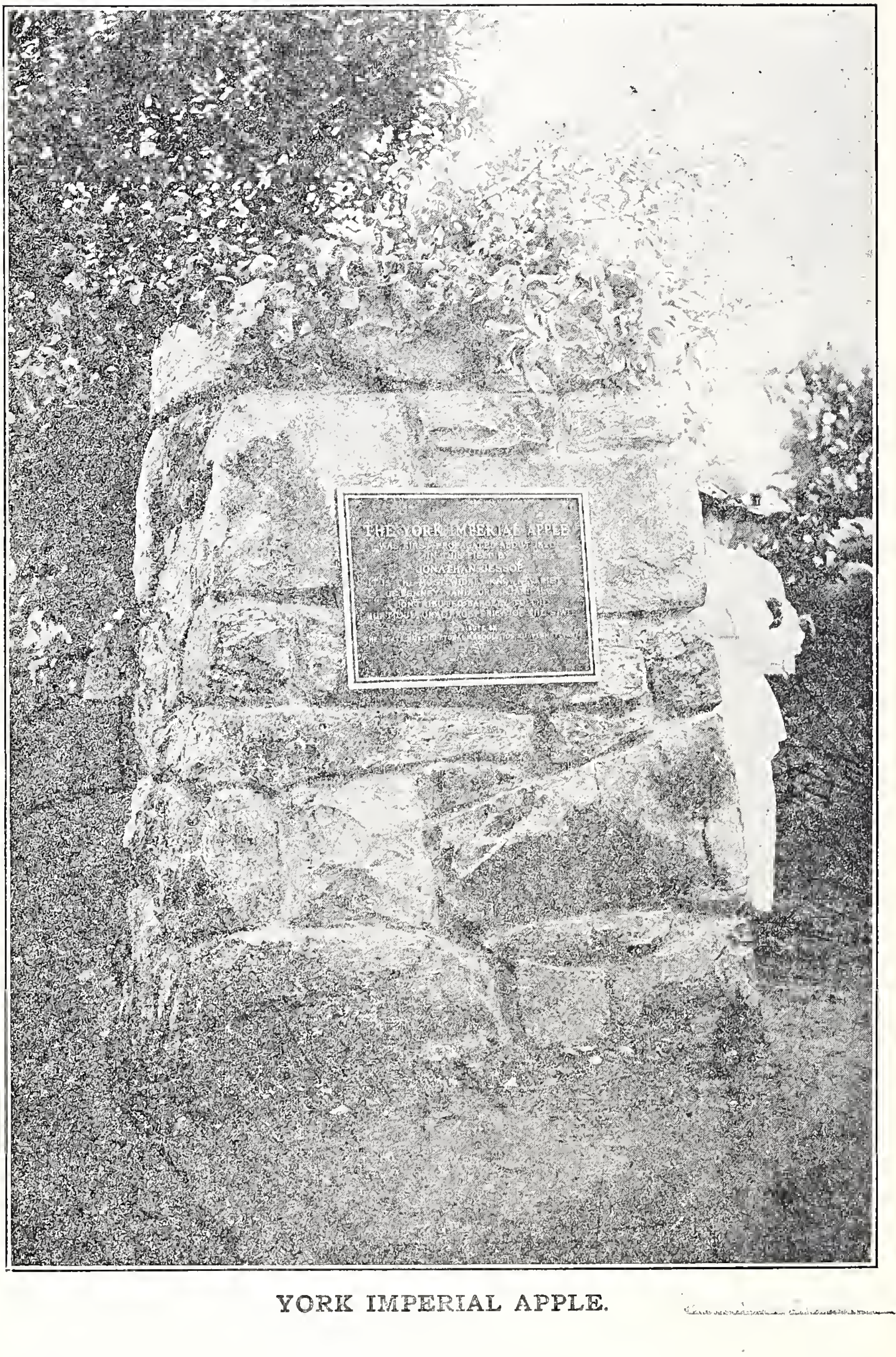

YORK IMPERIAL APPLE.

#329

THE APPLE INDUSTRY OF PENNSYLVANIA

THE RESULTS OF AN ORCHARD SURVEY CONDUCTED BY THE DEPARTMENT OF HORTICULTURE, PENNSYLVANIA STATE COLLEGE AND THE PENNSYLVANIA STATE DEPARTMENT OF AGRICULTURE.

Compiled By
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HARRISBURG, PENNSYLVANIA.
1922

LETTER OF TRANSMITTAL

Harrisburg, Pennsylvania,
Nov. 1, 1921.

Hon. William C. Sproul,
Harrisburg, Pennsylvania.

Sir:

I have the honor to transmit for your consideration and approval, a report embodying the important features of apple production and marketing in Pennsylvania.

This report compiled through the joint efforts of the State Department of Agriculture and the State College, while intended primarily for the information of Pennsylvania fruit-growers and farmers, also should stimulate wholesome investment, by any who desire to participate in this remunerative industry. It has been designed, as well, to serve as a manual for the information of public schools, teachers and agricultural institutions and the data brought together for the first time in this complete form, will prove a valuable guide for many years to come.

This report represents the first of a series of comprehensive bulletins on the agricultural resources of Pennsylvania, to be followed by others on allied subjects, as rapidly as conditions will permit.

Yours very truly,

FREDERICK RASMUSSEN,
Secretary of Agriculture.

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FOREWORD

Of all the States, Pennsylvania in 1920 ranked second in total production of apples. Although there was an increase in population in the State of 2,417,902 from 1899 to 1919, during the same period the number of apple trees decreased approximately four and three quarter millions. This decrease in trees took place largely in the old farm orchards and the apple industry of the State today is advancing on a commerical scale which is very promising both from the standpoint of those engaged in apple growing as well as the entire commerical and industrial life of the State.

The nearer to the cities and industries the food supply of the State can be produced, the greater advantage to both the producer and consumer. This is especially true of perishable products, such as fruit. There are in Pennsylvania 170 cities and boroughs with a population of over 5,000, and 144 cities and boroughs of over 2500. The soils and the climate of the State are such that apples can be produced successfully in nearly all the counties. The advantage of growing fruit near potential markets cannot be over estimated, and it is expected that the largest development in fruit growing in Pennsylvania will not be in the planting of large orchards for the wholesale trade but in planting smaller orchards of from ten to twenty-five acres on farms where other products are grown to supply the numerous excellent local markets .

The cost of production of apples in Pennsylvania is less than in many other sections of the country, and good apples can be produced at a cost per bushel no greater than the price the growers of the Pacific Coast pay the railroad for transportation charges on their apples to the eastern markets.

It is universally recognized that in flavor Pennsylvania apples are superior to the apples from the Pacific Coast. Under a careful system of grading and more attention to details in marketing the apple growers of Pennsylvania need not fear the western competition. The real competition in apple production which Pennsylvania has to meet is from neighboring states, especially New York. However, if the orchardists of Pennsylvania are as efficient in production and marketing as these competing states the nearness to markets will still give the advantage to the Pennsylvania producers.

Apple growing today is a well defined business. It can only be carried on successfully by men who make a study of the business and apply the very best methods in orchard management. The failures in apple production are generally due to lack of knowledge of fruit growing in a particular region or an unfortunate selection of location or variety. An accurate knowledge of the apple industry of the State is not only of value to present and prospective fruit growers but also to a large number of business activities, such as barrel and box manufacturers, manufacturers of spraying materials and orchard supplies, automobile truck and tractor manufacturers, as well as apple buyers and operators of cold storage plants.

There is no doubt in the minds of men familiar with the climate and soil conditions and the marketing opportunities in the State that apple growing will be of increasing importance in the agricultural development of the State. The opportunities are here and when presented and understood will soon attract both men and capital. The State has passed through its transition period from the small farm orchard to the commercial orchard. The knowledge of successful apple growing and marketing is available, and the beginner of today has not only this knowledge to build on but can profit by the mistakes of the past.

Realizing the importance of a clear understanding of the history and development and future possibilities of the apple industry of the State, the Department of Agriculture in cooperation with the Pennsylvania State College during the summer of 1920 made a survey of this industry. It was not the plan to visit all the orchards in the State but to visit a sufficient number in each region so as to get definite knowledge of present practice and opportunities and, from these records, together with the records of the U. S. Census of 1920 and other data, make available for public information and future reference this publication on the Apple Industry of the State.

A number of men both from the Department of Agriculture and the Pennsylvania State College participated in the gathering and compiling of this information. It is not possible here to give a complete list of all who aided in the work, but acknowledgement should be given to R. D. Anthony, J. H. Waring, S. W. Fletcher, F. B. Lincoln, G. W. Cochran, and E. W. Jenkins, of the Pennsylvania State College, and to E. F. Peirce, F. L. Holdridge, A. O. Finn, A. W. Buckman, of the Bureau of Plant Industry of the Department of Agriculture, all of whom participated in the survey. The marketing information was contributed by W. C. Lynn and P. R. Taylor of the State Bureau of Markets. Valuable marketing statistics were also obtained from the Bureau of Markets of the U. S. Department of Agriculture.

FRED RASMUSSEN,
Secretary of Agriculture.

THE APPLE INDUSTRY IN 1920

Bearing Trees	6,988,594
Production [Est.]	20,825,000 Bu.
Value	$18,742,500

The history of apple-growing in Pennsylvania is as old and time-honored as the State itself. Unfortunately the increased production of apples has not kept pace with the increase in population and corresponding demand. During the year ended 1920, Pennsylvania produced apples to the total value of $18,742,500. To satisfy the growing demand of the State these figures can be conservatively doubled, with no loss attendant on overproduction, through the encouragement of by-product factories, and the creation of a market for standardized fruit.

PENNSYLVANIA AS AN APPLE-PRODUCING STATE

According to the Census of 1920, Pennsylvania ranked fourth among the States, with a total of 6,988,594 bearing apple trees, and third, with an additional 2,628,053 apple trees coming into bearing. In other words, in two more years the State should show a grand total of approximately ten million bearing apple trees.

However the total production from even ten million bearing trees will hardly more than fill the local demand for apples and offset the depreciation caused by the dying out of old orchard plantings.

At the present time our great marketing centers, Philadelphia and Pittsburgh, are receiving large shipments of apples from California, Oregon, Washington, Illinois and New York, not because this State cannot produce enough good apples, but simply because it does not.

WHY PENNSYLVANIA SHOULD GROW MORE APPLES

The wide range of soils favorable to apple growing, the large number of varieties of apples that can be profitably grown over most of the State, the facilities for reaching our large marketing centers, the availability of future Atlantic Coast markets, and the unsurpassed climatic features making for a maximum growing season, all should combine to create added interest in this highly remunerative business.

WHAT KIND OF APPLE TO GROW

A census taken among the most prominent apple growers of Pennsylvania shows that for the five regions of the State generally, the "Stayman" was favored as the most profitable among 255 growers. "York" was a close second with 250 growers and "Baldwin" third with 156. "Northern Spy" polled 69 votes, and Grimes, Ben Davis, Jonathan, Rome, Stark, Smokehouse and R. I. Greening, Black Twig, Astrachan, McIntosh and Winter Banana followed in order named.

Thus the wide variety of apples that may be profitably grown under Pennsylvania conditions is at once apparent and should offer encouragement to any who contemplate engaging in this industry.

FRUIT REGIONS AND TYPES OF ORCHARDS

Mountain ranges, river valleys and market locations combine to make fine, rather sharply differentiated, fruit regions of the state. In one of these, the Southern region, apples are the main, and sometimes the only, cash crop. Here the orchards are large and the fruit is sold in carlots and shipped by rail. In three of the other regions there are large centers of population. Within truck-haul of these centers, systems of local marketing have been developed and much of the farm produce reaches the consumer without passing through the hands of a middle-man unless it be a grocer. Here are found orchards of medium size on farms where fruit is but one of several cash crops.

There are large areas of the State in which there are no local markets of any considerable size and in which fruit growing has not been considered of much importance. In earlier years every farm had its own orchard of one to two acres, and the fresh fruit, the cider, the vinegar, and the apple butter for the small towns and the farms were supplied by these orchards. Neglect, diseases and insects have wiped out millions of these trees and, with the rapid falling off of fruit production by these small farm and home orchards, there is a brisk demand which is being met by the planting of some excellent commercial orchards and the rejuvenation of the better old orchards.

PENNSYLVANIA SOILS WELL ADAPTED TO APPLE GROWING

The ice cap which pulverized and mixed the rock and soil of the regions north of Pennsylvania during the glacial period was held back by the mountains so that only about a quarter of the State was glaciated. The soils of the remaining part are the result of the

A PENNSYLVANIA FARMSTEAD WITH SHELTERING APPLE TREES.

decomposition of the native bed rock; consequently we find many differing soil types.

Soils derived from limestone constitute some of the richest agricultural areas of the state, but these are usually valley soils. The favorite fruit soils are usually those that are derived from the shales and sandstones which form the ridges overlooking the valleys.

Soils may be divided into classes according to the varying amounts of rock fragments, sand and silt which they contain. The following list of the types most commonly used is arranged so as to show the preference of apple growers: gravelly loam, stony loam, sandy loam, shale loam, clay loam, loam, silt loam. It will be noted that soils with the best drainage are in the first part of the list.

COMMON CULTURAL METHODS.

Diseases and insects have become so common that the neglected orchard has been killed or has fallen so low in production that it is of little commercial importance; yet there is much to be gained through improvement in the care given Pennsylvania orchards, particularly the smaller ones.

Pennsylvania orchards are usually hillside orchards and, therefore, erosion is an important factor. Partly because of this and partly because of the high average rainfall, a very considerable proportion of these orchards are in more or less permanent sod. Sod orchards receiving additions of nitrogenous fertilizers are productive; but sod without fertilizers, especially if the grass is removed as hay, soon lowers the vigor of the trees.

MARKETING THE CROP

Probably three-fourths of the apples of the state reach the consumer without being handled by a railroad; and usually these apples are sold in some package other than the barrel. For these reasons, grading and packing have not been developed to the same extent as in New York. A state grading law is now being considered. An improvement in the quality of the fruit sold in the local markets of the State is greatly to be desired.

The development of the auto truck is having an important influence upon the apple industry, since it has extended the area which can supply the local markets. Because more fruit can be hauled directly into the markets, it is becoming imperative that the growers have some means of storing part of the crop in order to avoid putting too much on the market at picking time. There are many excellent common storages on the Pennsylvania fruit farms but the number should be increased.

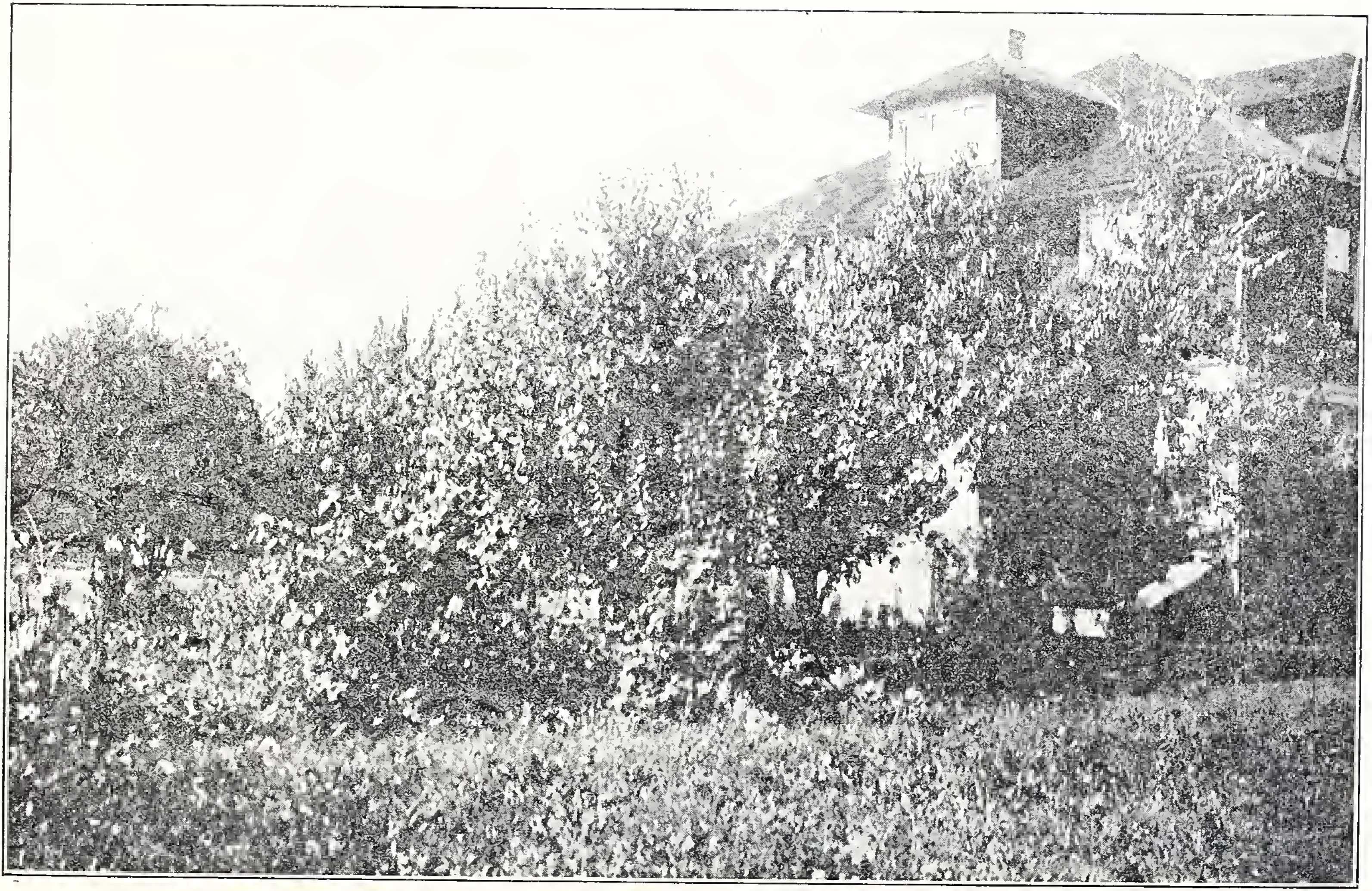
THE APPLE INDUSTRY OF PENNSYLVANIA.

HISTORY OF APPLE GROWING IN PENNSYLVANIA

One of our early fruit growers, writing in the "Farmers' Cabinet" of February, 1844, says, "The spirit of planting fruit trees is beginning to revive after having lain almost dormant for 20 to 30 years. Our ancestors, 60 to 80 years ago, planted fine orchards which have gradually died off with those who planted them. We now begin to witness a demand for the best varieties and during the late autumn many thousands of fine fruit trees were sold by auction in Philadelphia." Such a statement, made more than 75 years ago, serves to remind us that fruit growing is not an infant industry in Pennsylvania.

When the first settlers reached this country they were struck with the abundance of wild fruit and naturally, they soon sought to establish fruit plantations. The chief purpose of fruit in those early days was to supply cider, wine and brandy and this fact had an important bearing on the early development of pomology in Pennsylvania. Because of the difficulty of transporting young trees, the early settlers from Europe usually brought seeds instead of trees or vines and as "quantity rather than quality" was desired for cider making, large numbers of seedling trees were planted almost as soon as the first clearings were made. As successive waves of emigration carried the western frontier from the Atlantic to the Alleghanies, and later into what was then the territory south of the Ohio, new seedling plantations arose in all parts of Pennsylvania. At first the chief purpose of these plantings was to supply the cider then so much in demand for log-rollings, husking bees and the few social gatherings the settlers could enjoy and for this purpose almost any kind of seedling could be used; soon a demand for the better seedlings for fresh fruit arose and, as methods of grafting became better known, orchards of selected kinds of apples began to appear. Many of our present varieties are selections from the thousands of seedlings that once grew in Pennsylvania.

The early days of the Nineteenth Century saw a remarkable development of interest in fruit-growing. Horticultural societies flourished and amateurs in every part of the country were testing new varieties and reporting those especially adapted for use in the different regions. The work of Bartram, Darlington, Warder, Brickle, Moon, Meehan and many others equally well-known, placed



A CITY LOT THAT GIVES A GOOD SUCCESSION OF FRUIT—23 VARIETIES.

Pennsylvania high in the list of States that have made pomological history and it was the interest of such men as these that aided in making America a fruit-loving nation.

With the exception of a few plantings in the neighborhood of Philadelphia, commercial apple culture did not become important until the second quarter of the last century. Then the rapid development of railroads and canals made it possible to move fruit quicker and cheaper and, the growth of the cities having created the demand, commercial plantings were started in all parts of the State. This movement was checked to some extent during the years of the Civil War, but the period of prosperity immediately following furnished renewed impetus and vigor. The old orchards one sees today in the State are but a fragment of those set out during this period. Panics and general business depressions beginning about 1870 again retarded fruit planting to some extent but the greatest discouragement to the apple men came about the year 1885. The trees planted just preceding and following the Civil War were then coming into full bearing, increasing the total production of the country by leaps and bounds but marketing methods were very crude, storage facilities were limited and the country had not yet recovered its business balance. As a result large quanities of apples rotted on the ground, growers became discouraged and abandoned or pulled out their orchards and for ten years there was very little new planting.

The pendulum began to swing the other way about 1895. Better marketing methods and increased storage facilities gave wider distribution to the apple crops and the continued increase in city population created a larger demand for fruit and for fruit products. Prices advanced rapidly, creating a renewed interest in orchard planting. This stimulated interest in fruit growing continued to progress with but one short break, until the beginning of the World War and has placed Pennsylvania in a leading position among the first five States in commercial apple production.

STATISTICAL RECORDS OF DEVELOPMENT.

Statistical records touching on apple growing in the early days are meager. The United States Census for 1870 gives the value of all orchard products for the counties of Pennsylvania, as then constituted and since the apple was the chief fruit, these figures may be taken as fairly representing the importance of this fruit at the time. From the records (Chart I) it will be seen that the main centers of apple growing were close to Pittsburgh, Philadelphia and the other larger markets, and that the chief shipping sections along the northern tier and in the Cumberland Valley at that time were just coming into importance. The census for 1880, the next decade, (Chart II) also reported the value only, of all orchard products. The orchards in the Pittsburgh area now had come into sufficient prominence to put Allegheny County at the head of the list and the numerous small farm plantings of Erie, Crawford and Mercer brought these counties into prominence.

The Census of 1890 (Chart III), was the first to report the number of bearing apple trees. Commercial apple growing now had become considerably more important and the rank of several of the northern tier counties shows that apple trees can be grown there successfully. Why the area supplying the Philadelphia markets should have made such a poor showing is not clear. The number of trees of bearing age reached the high-water mark about 1900 (Chart IV) with a total of over eleven and one-half millions. The heavy plantings throughout the State from 1860 through to 1880 now were in bearing and although the orchards were small in many counties nearly every large farm had its own planting of apples. Yet several counties where fruit-growing later became an important factor are not included in the first twenty-five counties listed during that period. Adams, Cumberland, Montgomery, Wyoming, Beaver and Lawrence are missing from the list and Franklin ranks only as nineteenth.

The years between 1900 and 1910 were epoch-making in the history of Pennsylvania horticulture. The wave of commercial planting which made its start about 1895 had sprung into rapid growth by 1900 and continued to increase in intensity until about 1904 or 1905. It was at this time that growers began fully to realize what a menace San Jose scale was to apple growing and planting began to fall off immediately. This is seen in the drop in the curve in Chart V which gives the ages of the orchards visited during the survey. Fortunately, lime-sulphur was already being tested as a control measure and by 1908 or 1909 its value was fully realized and the fear of scale now removed, planting was started with renewed vigor.

While these new orchard regions were being built up, many of the older orchards were being swept away when they should have been in their prime. The old farm orchards were not of sufficient size or did not appear of enough value to the owners to make it worth while to buy expensive spray machinery or to experiment with new sprays. Most of them were in sod and they were more likely to be used as pasture than to be given any fertilization. When the scale came it swept through unchecked and the trees did not have the vigor to withstand its attack long. There were 25 counties with more than 200,000 bearing apple trees in 1900; in

1910 there were only seven. (Chart VI). During the last decade, from 1910 to 1920, this elimination has continued but at a slower rate. The older orchards have gone out until now Adams, Bedford, Franklin and York are the only countines with more than 200,000 bearing trees. (Chart VII).

A study of the trees not of bearing age in 1920, as shown in Chart VIII and a review of Chart V to see the relatively large proportion of orchards covered by the survey that are under twenty years of age, show that Pennsylvania has passed through the period of decline and is rapidly increasing the commercial production of apples. Sixteen counties have over 50,000 young trees and when we add bearing and non-bearing trees, there are thirteen counties with a total of over 200,000 trees. (See Chart IX). These are chiefly trees just coming into their period of full production, and they are given good enough care to continue to increase their production for many years to come.

It is unfortunate that the Federal Census results, Tables 3 to 8, inclusive, are reported in number of trees per county instead of in acres. Orchards are planted considerably closer in the Southern and Southeastern Regions and in the southern part of the Central Region than in most of the other regions of the State and a considerable number of orchards in these regions are still inter-planted with apple fillers. A thousand trees in Adams County probably will not occupy three-quarters as much land as the same number of trees in the older orchards of Luzerne County. It is much safer to compare yields on an acre basis and nearly all fruit growers think of their orchards as containing so many acres and not so many trees. For this reason the figures for the orchard survey were secured on an acre basis.

The Federal Census returns also report yields for the year preceding that in which a given census was taken. In preparing this report very little emphasis has been placed on these yields for several reasons. One census report may cover a year of heavy crops and the next a light crop year or there may be an abnormal crop in certain counties only. Also very few Pennsylvania growers can give an accurate statement of their crop. Chart X gives the rank in yield in 1919 of those counties recorded by the Federal Census as producing more than 100,000 bushels of apples.

Table 1. VALUE OF ORCHARD PRODUCTS IN 1870.

(Counties producing more than $90,000)

Rank	County	Value
1	Chester	$232,279
2	Lancaster	218,566
3	Bucks	184,196
4	Berks	171,215
5	Allegheny	170,557
6	York	156,149
7	Erie	131,481
8	Washington	130,612
9	Fayette	122,089
10	Westmoreland	114,840
11	Bradford	110,154
12	Butler	98,341
13	Franklin	96,008
14	Tioga	93,814
15	Adams	93,580
16	Greene	93,406

Chart I:—Value of orchard products in 1870. Rank of counties producing more than $90,000. Between $90,000 and $125,000 ▤

Between $125,000 and $150,000 ▥ Above $150,000. ▦

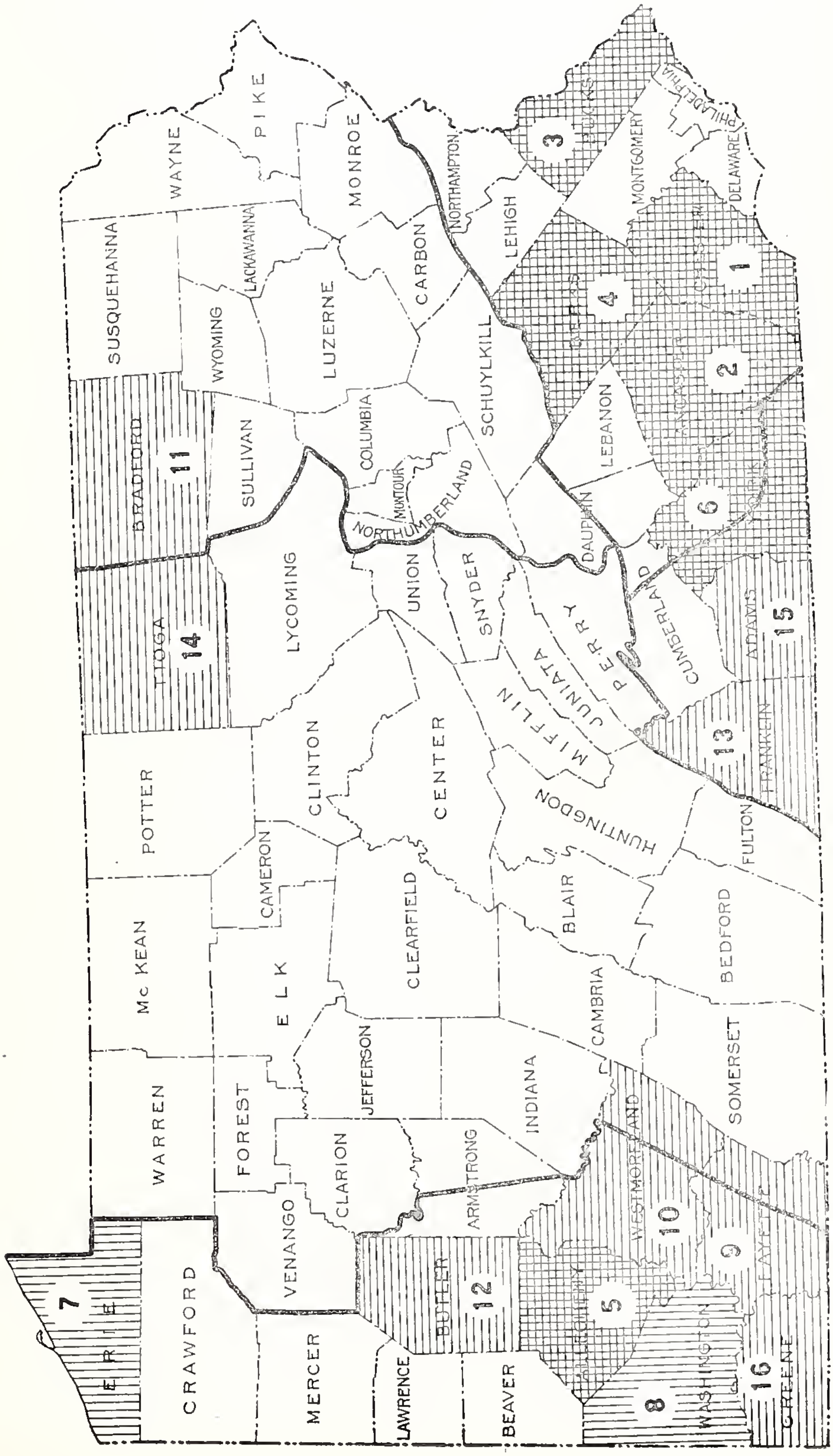


Table 2. VALUE OF ORCHARD PRODUCTS IN 1880.

(Counties producing more than $100,000)

Rank	County	Value
1	Allegheny	$250,260
2	Bucks	179,943
3	Westmoreland	151,604
4	Berks	140,701
5	Crawford	139,972
6	Mercer	127,015
7	Erie	125,550
8	Indiana	123,109
9	Butler	122,033
10	Washington	119,833
11	Bedford	116,837
12	Somerset	107,013
13	Susquehanna	105,608
14	Clearfield	103,335

Chart II:—Value of orchard products in 1880. Rank of counties producing more than $100,00. Above $150,000 ▦ Counties between $125,000 and $150,000 ▥ Counties between $100,000 and $125,000 ▤

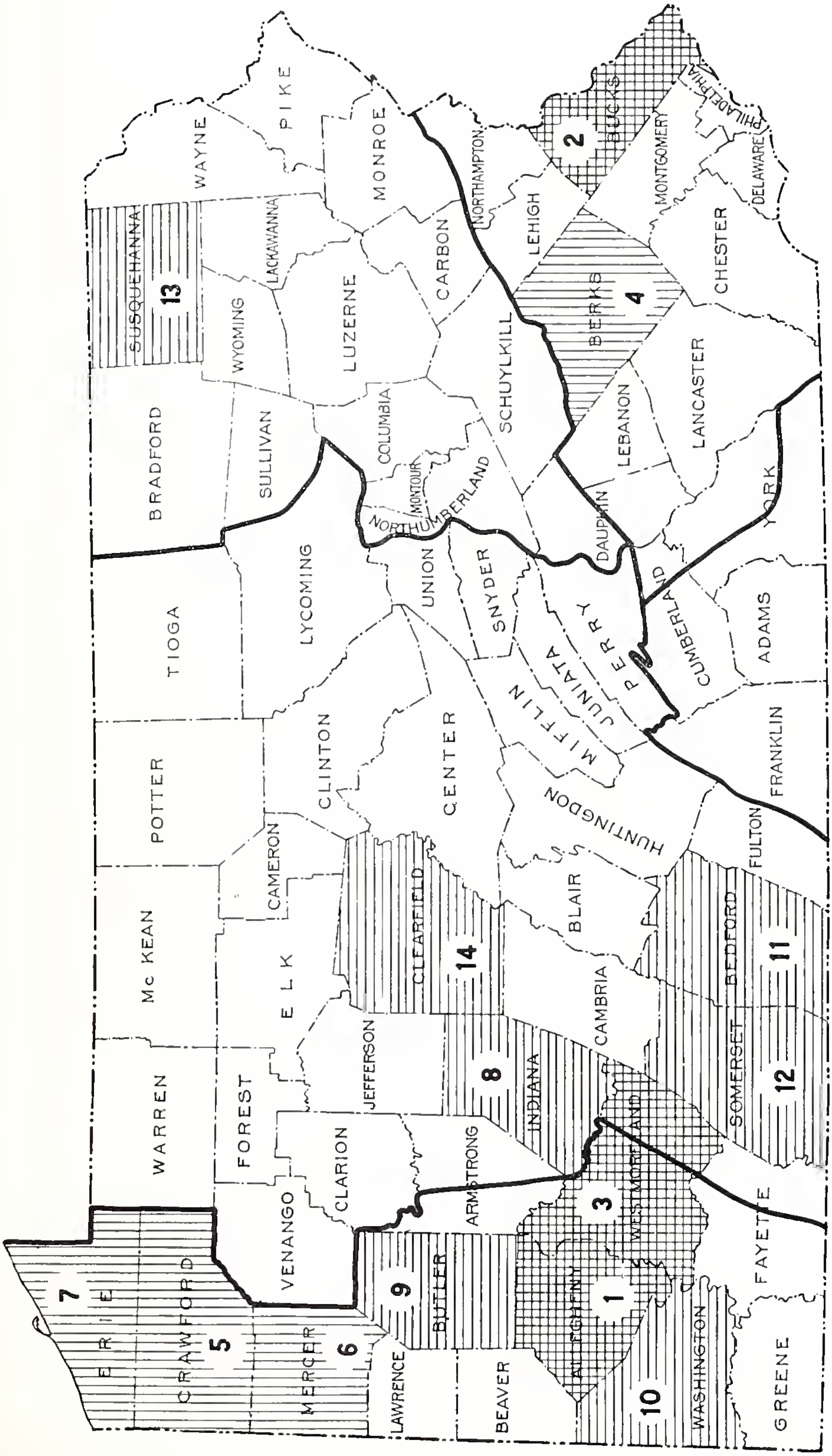


Table 3. NUMBER OF APPLE TREES OF BEARING AGE IN 1890

(Counties having more than 200,000 trees of bearing age)

Rank	County	Trees
1	Allegheny	349,310
2	Crawford	336,195
3	Erie	312,269
4	Butler	284,500
5	Susquehanna	275,172
6	Westmoreland	270,347
7	Berks	256,963
8	York	246,924
9	Bucks	246,078
10	Tioga	226,077
11	Bradford	220,221
12	Mercer	219,708
13	Wayne	217,431
14	Washington	207,574
15	Armstrong	206,069

Chart III:—Number of apple trees of bearing age in 1890. Rank of counties having more than 200,000 bearing trees. Counties with more than 300,000 trees ▦ Between 250,000 and 300,000 trees ▥

Between 250,000 and 300,000 trees ▤

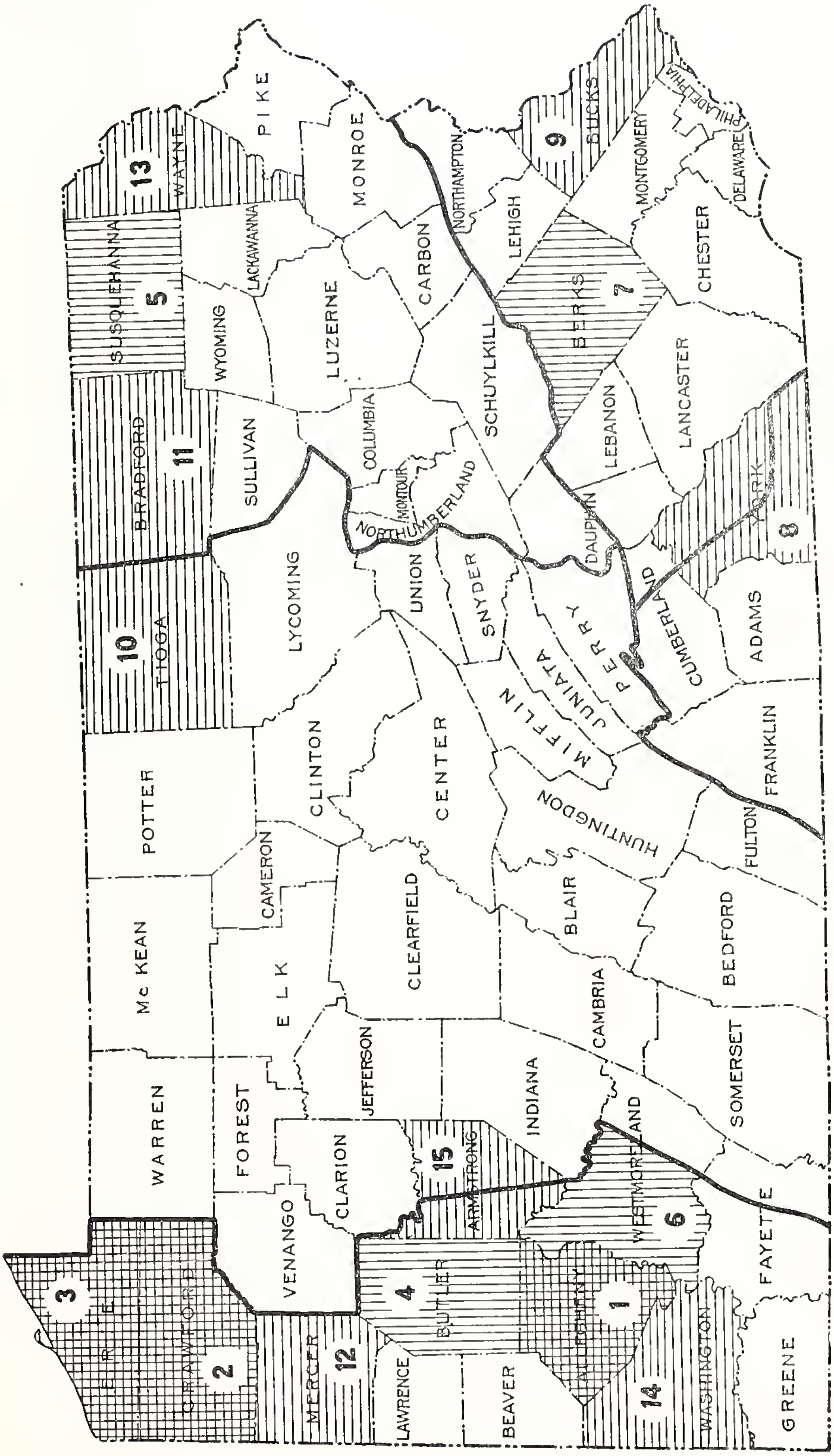


TABLE 4. NUMBER OF APPLE TREES OF BEARING AGE IN 1900.

(Counties having more than 200,000 trees of bearing age)

Rank	County	Trees
1	Allegheny	463,369
2	Berks	397,381
3	Erie	336,684
4	Butler	325,381
5	Crawford	320,529
6	York	314,743
7	Bedford	305,686
8	Bucks	302,409
9	Susquehanna	298,013
10	Westmoreland	287,689
11	Mercer	286,067
12	Wayne	284,944
13	Somerset	266,995
14	Tioga	258,473
15	Lancaster	255,041
16	Armstrong	246,803
17	Bradford	244,258
18	Washington	230,408
19	Franklin	229,326
20	Lycoming	226,486
21	Indiana	219,999
22	Chester	218,447
23	Luzerne	211,392
24	Greene	204,391
25	Clearfield	200,644

Chart IV:—Number of apple trees of bearing age in 1900. Rank of counties having more than 200,000 trees of bearing age. Above 300,000 trees

▦ 250,000 to 300,000 trees ▥ 200,000 to 250,000 trees. ▤

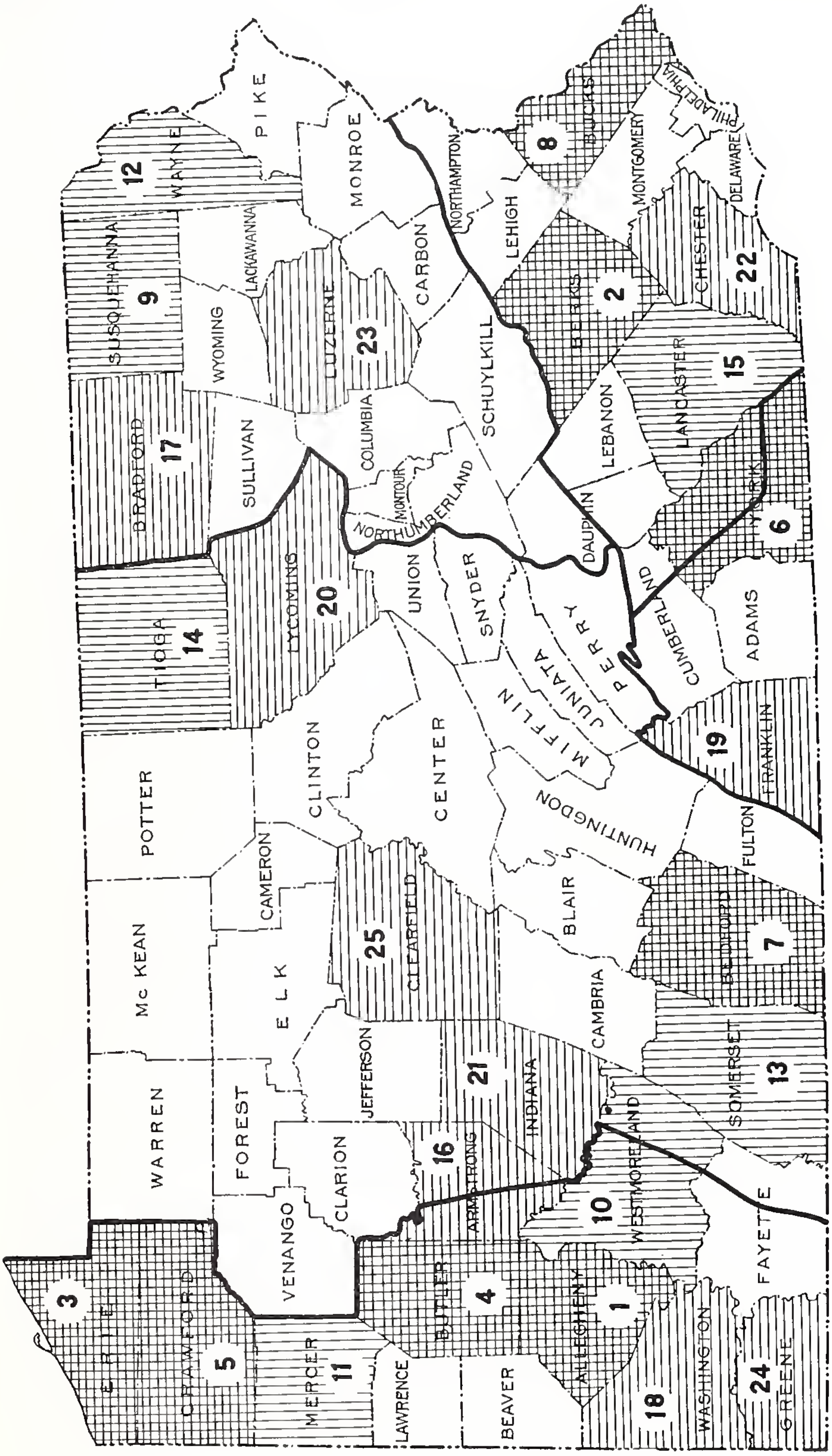
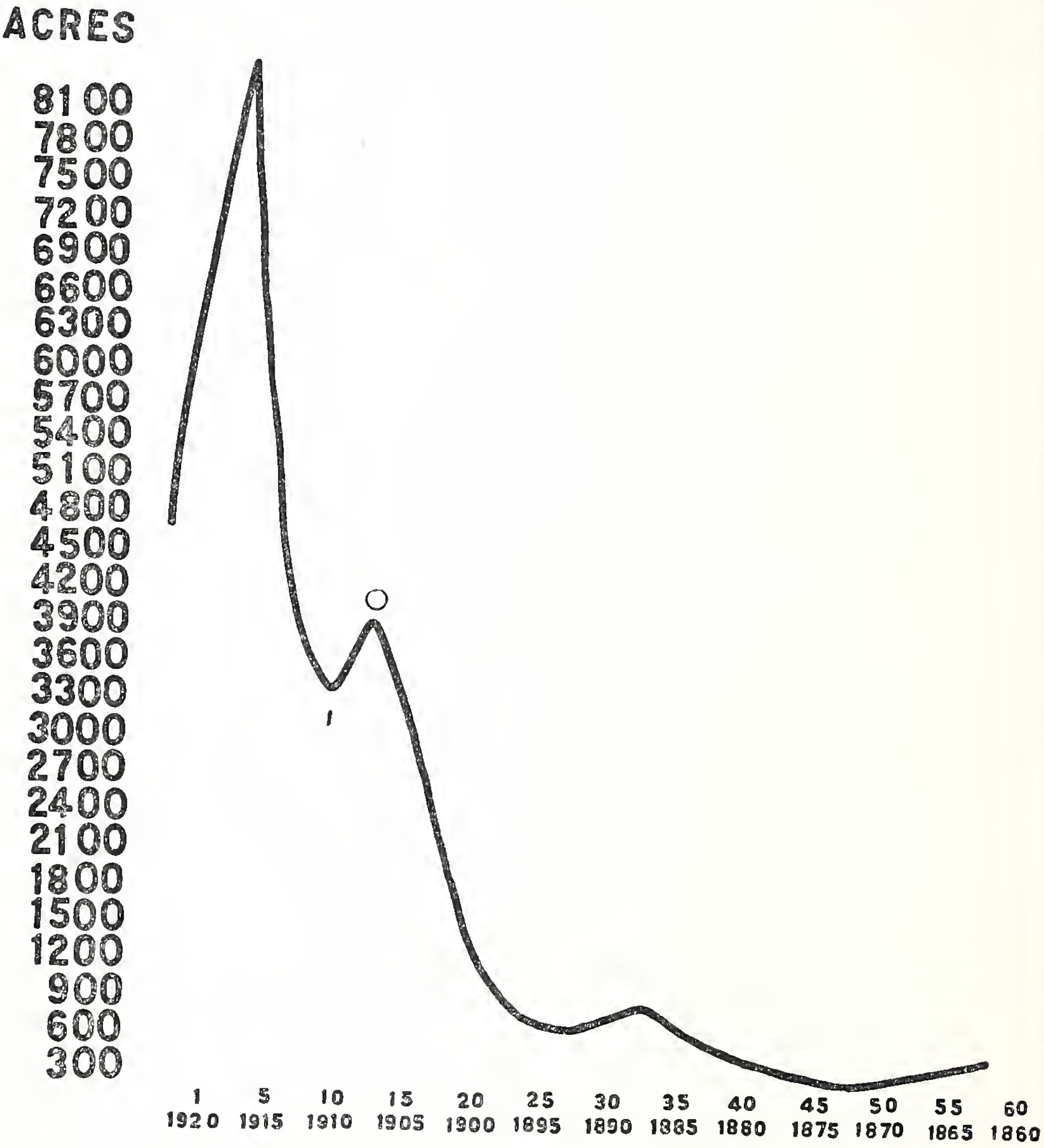


CHART V. ACREAGE SURVEYED OF VARIOUS AGES.



Age of Orchards and Years Planted.

°Slowing up of planting about 1904 due to fear of San Jose scale.

†Planting again under full way because of discovery of value of lime-sulphur spray.

Table 5. NUMBER OF APPLE TREES OF BEARING AGE IN 1910.

(Counties having more than 200,000 trees of bearing age)

Rank	County	Trees
1	Bedford	273,141
2	Berks	261,740
3	Crawford	239,309
4	York	238,734
5	Allegheny	227,256
6	Butler	215,051
7	Susquehanna	208,614

Chart VI:—Number of apple trees of bearing age in 1910. Rank of counties having more than 200,000 trees of bearing age. Between 250,000 and 300,000. ▥ Between 200,000 and 250,000 trees. ▤

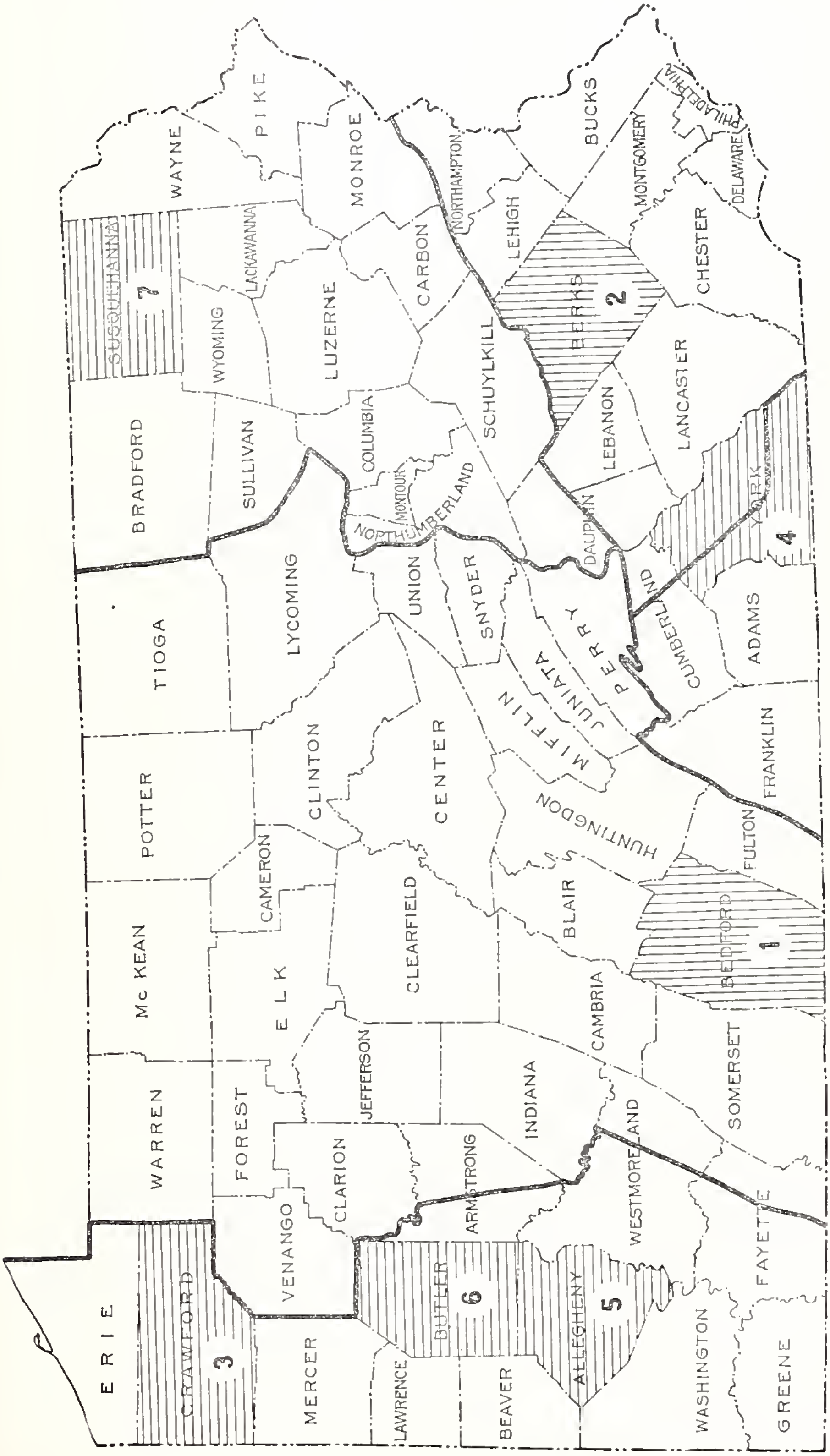


Table 6. NUMBER OF APPLE TREES OF BEARING AGE IN 1920

(Counties having more than 150,000 trees of bearing age)

Rank	County	Trees
1	Bedford	279,283
2	Adams	254,228
3	Franklin	239,011
4	York	234,526
5	Crawford	198,025
6	Berks	181,309
7	Wayne	178,596
8	Erie	171,757
9	Butler	165,238
10	Luzerne	165,133
11	Somerset	159,041
12	Susquehanna	158,674
13	Westmoreland	157,295
14	Allegheny	151,246

CHART VII:—NUMBER OF APPLE TREES OF BEARING AGE IN 1900. Rank of Counties having more than 150,000 trees of bearing age.

250,000 to 300,000 ▥ 200,000 to 250,000 ▤

150,000 to 200,000. ▨

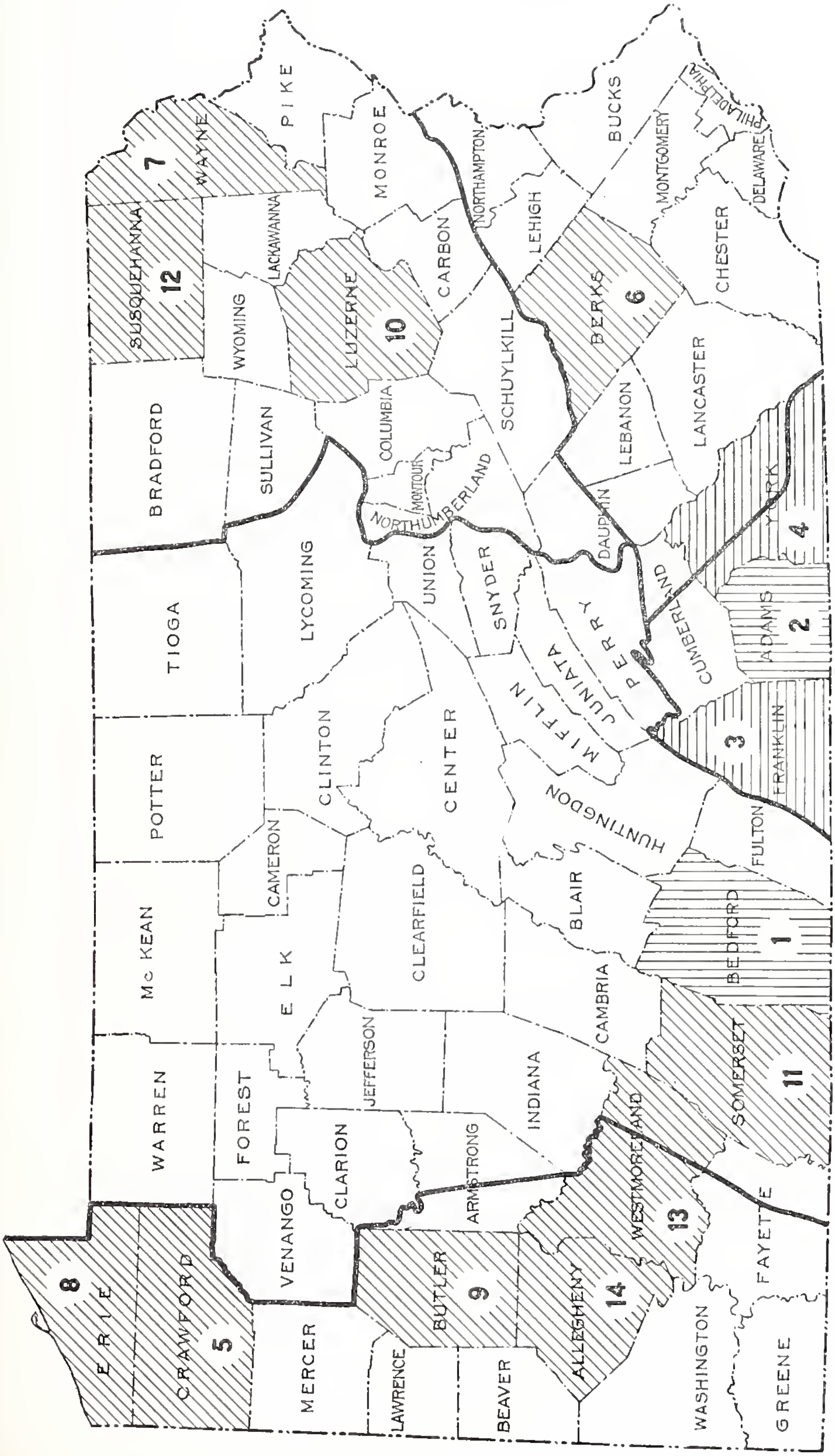


Table 7. NUMBER OF APPLE TREES NOT OF BEARING AGE IN 1920.

(Counties having more than 50,000 trees of non-bearing age)

Rank	County	Trees
1	Adams	280,335
2	York	141,938
3	Franklin	101,424
4	Lancaster	98,191
5	Berks	96,869
6	Luzerne	90,829
7	Cumberland	77,271
8	Chester	67,421
9	Bucks	65,844
10	Montgomery	65,187
11	Wyoming	63,609
12	Bedford	59,893
13	Allegheny	57,079
14	Schuylkill	54,903
15	Beaver	54,679
16	Westmoreland	51,638

Chart VIII:—Number of apple trees of non-bearing age in 1920. Rank of counties having more than 50,000 trees of non-bearing age in 1920.

Over 150,000 ▦ Between 125,000 and 150,000 ▥ Between 100,000 and 125,000 ▤ Between 50,000 and 100,000 ▨

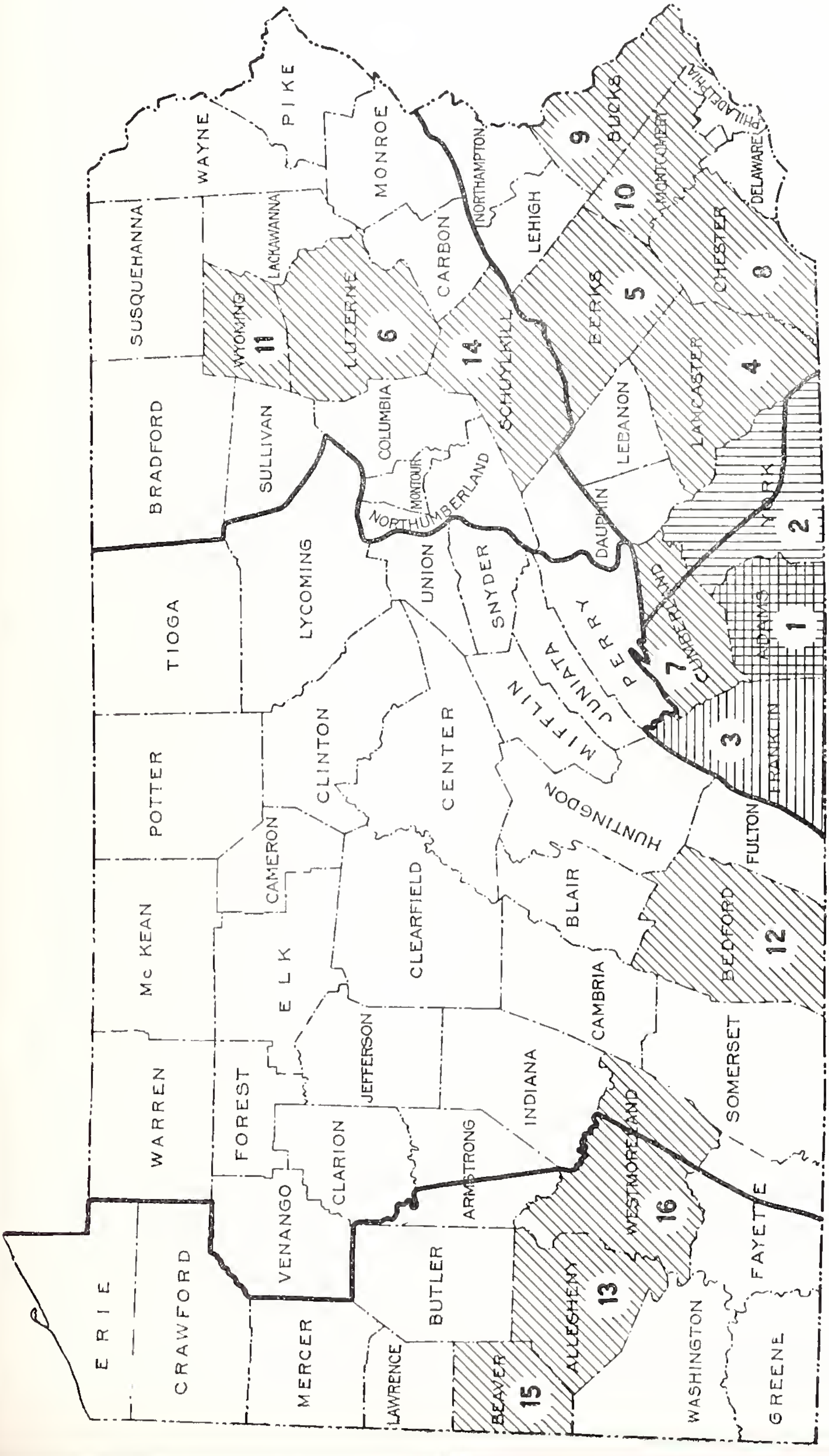


Table 8. TOTAL NUMBER OF APPLE TREES IN 1920.

(Counties having more than 200,000 trees)

Rank	County	Trees
1	Adams	534,583
2	York	376,464
3	Franklin	340,435
4	Bedford	339,176
5	Berks	278,178
6	Luzerne	255,962
7	Lancaster	222,622
8	Erie	218,436
9	Crawford	217,459
10	Wayne	213,932
11	Butler	209,253
12	Westmoreland	208,933
13	Allegheny	208,325

Chart IX:—TOTAL NUMBER OF APPLE TREES IN 1920. Rank of counties having a total of more than 200,000 trees. Over 300,000 ▦ 250,000 to 300,000. ▥ 200,000 to 250,000. ▤

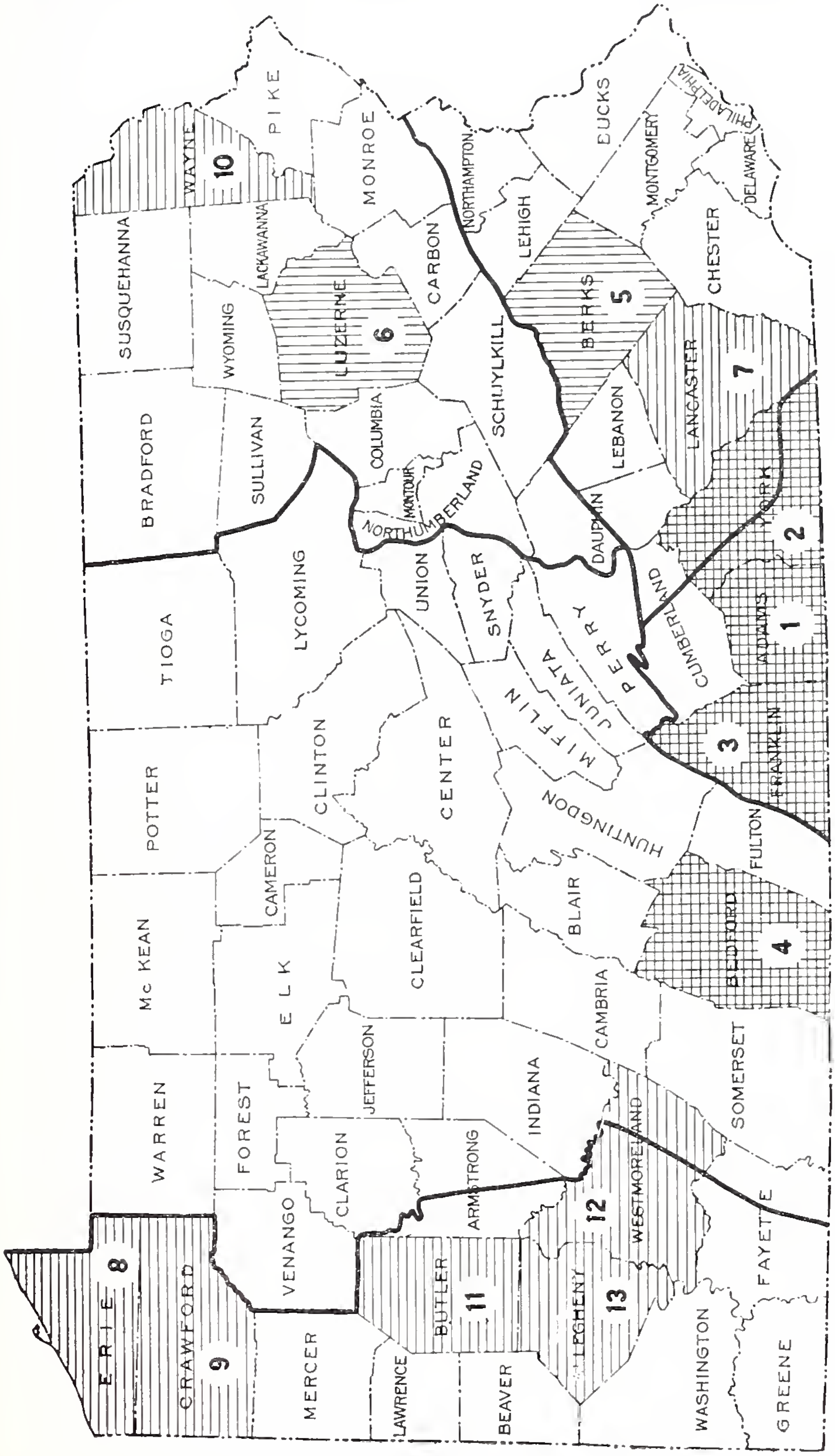


Table 9. APPLE PRODUCTION IN 1919.

(Counties producing more than 100,000 bushels of apples)

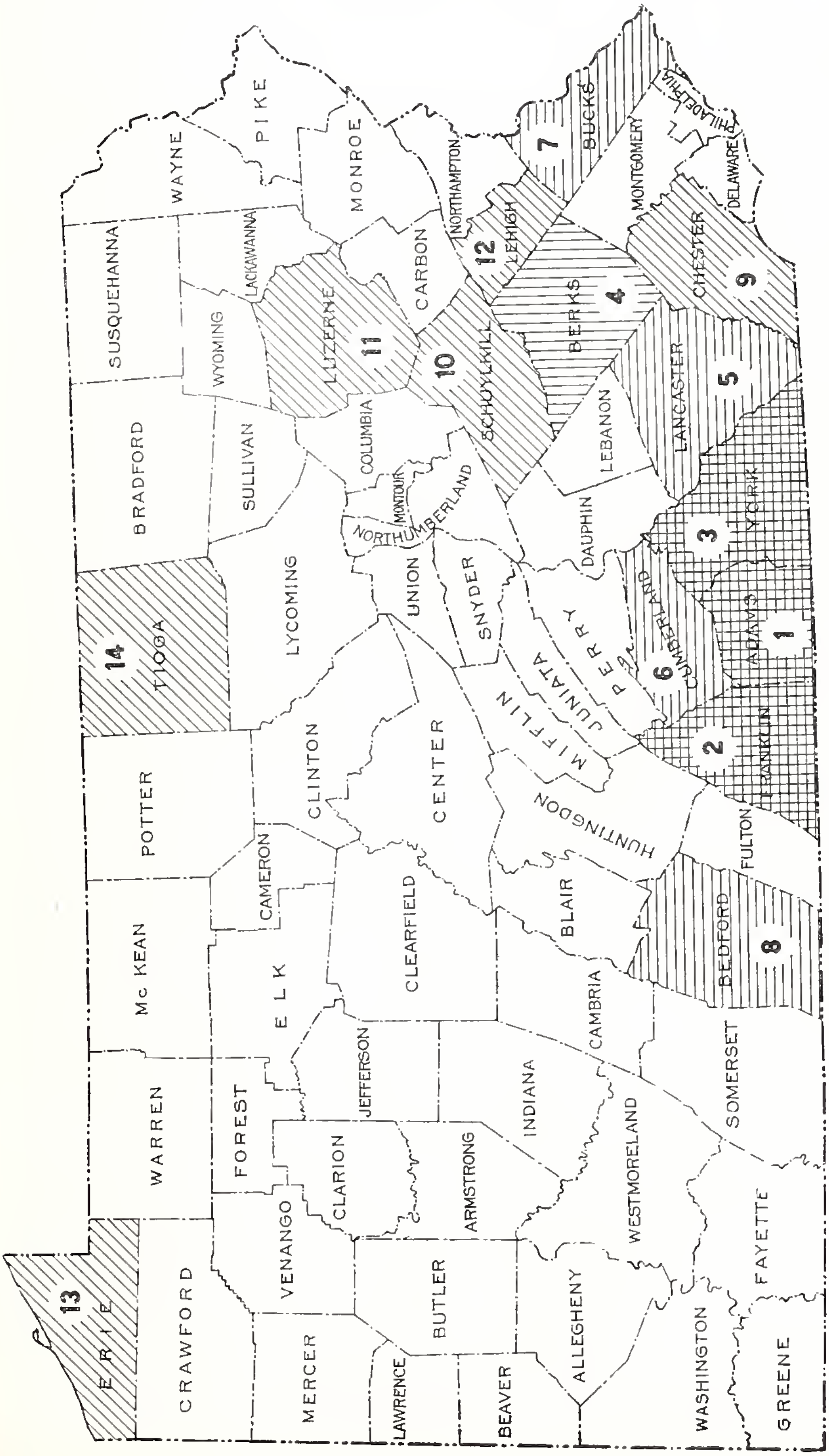
Rank	County	Trees
1	Adams	742,196
2	Franklin	468,205
3	York	310,811
4	Berks	254,453
5	Lancaster	169,244
6	Cumberland	167,083
7	Bucks	152,404
8	Bedford	152,314
9	Chester	148,574
10	Schuylkill	123,443
11	Luzerne	121,316
12	Lehigh	120,867
13	Erie	119,838
14	Tioga	103,471

CHART X:—APPLE PRODUCTION IN 1919.

Rank of counties producing more than 100,000 bushels.

From 100,000 to 150,000 ▨ From 150,000 to 200,000. ▤

From 200,000 to 300,000. ▥ Over 300,000. ▦



PENNSYLVANIA COMPARED WITH OTHER APPLE STATES.

Thirty years ago, when the census of 1890 was taken, Pennsylvania ranked third in number of bearing apple trees while her neighbors, New York and Ohio, ranked first and second respectively. (Chart XI). Apple trees at this time were largely confined to the northeastern States and the Ohio and central Mississippi valleys.

Ten years later, in 1900, there was a rather surprising shift in rank in number of bearing trees. (Chart XII). Missouri was now first and Illinois, across the river, was third, while Pennsylvania had dropped to sixth though she had increased her number of trees from nine millions to over eleven and one-half millions. New York and Ohio still led this State, although both had also dropped in rank. Kansas, along with Missouri, had increased her rank by nearly doubling her acreage.

The next ten years, to 1910, brought few changes among the leading ten States. (Chart XIII). Pennsylvania dropped in number of trees to a million under the record of 1890, a loss of four million bearing trees in ten years, yet in rank, advanced to fifth place, next to Ohio. Missouri still held first place though she had lost nearly six million bearing trees in the decade. Some of the greatest changes in rank were taking place in states below the first ten. Here the States of the Pacific Northwest were rapidly advancing in total acreage and more rapidly in rank.

The present census (Chart XIV) shows the greatest shift in our leading states since statistical records have been available. Missouri's orchards had proved too uncertain in production to survive and that state has dropped to eighth place in number of bearing trees, while New York again has attained first place. Washington State, which does not show on the map of the leading dozen states ten years ago, is now in second place, with Virginia, which was in eighth place, now third. The orchards in Washington and Virginia are still young and are just coming into their period of maximum production. Although Pennsylvania again has lost a million trees in a decade, she has changed places with Ohio and ranks fourth. The increasing importance of the Pacific Coast and Western States also is shown by the rise of California, Oregon and Idaho, to fourth, fifth and eighth places respectively, in number of carloads of apples shipped in 1919. (See Chart XV).

Few persons who are not familiar with the transformation which has taken place in the apple industry of Pennsylvania during the last twenty years realize its growing importance. The State has lost several million trees but they were in the old home orchards which never played a very important role in commercial production and their places have been filled largely by well-cared for commercial orchards which are now coming into full production. The finest markets of the country—New York, Philadelphia, Pittsburgh, Washington, Baltimore and many others can be reached by auto trucks from the various fruit-growing regions.

Although the Federal Bureau of Markets places Pennsylvania among the first five States in the commercial production of apples, such a large share of her fruit is sold locally that reports of carlot shipments by States fail to indicate the true commercial importance. Thus Chart XV gives the rank of the leading States in number of carlots of apples shipped in the Season of 1919-20, the year covered by this survey; here Pennsylvania ranks fourteenth.

Table 10. RANK OF LEADING APPLE PRODUCING STATES IN NUMBER OF BEARING TREES.

(Census of 1890)

Bearing Trees Rank	State	No. Trees	Production Rank, 1889
1	New York	14,428,381	7
2	Ohio	10,860,613	1
3	Pennsylvania	9,097,700	10
4	Michigan	8,582,386	2
5	Missouri	8,150,442	6
6	Illinois	6,949,346	4
7	Indiana	6,089,106	5
8	Kansas	6,063,575	14
9	Kentucky	5,730,144	3
10	Tennessee	5,020,400	11
11	Virginia	4,253,364	8
12	North Carolina	4,249,468	9

Chart XI:—Rank of leading apple producing states in number of bearing trees. Census of 1890.

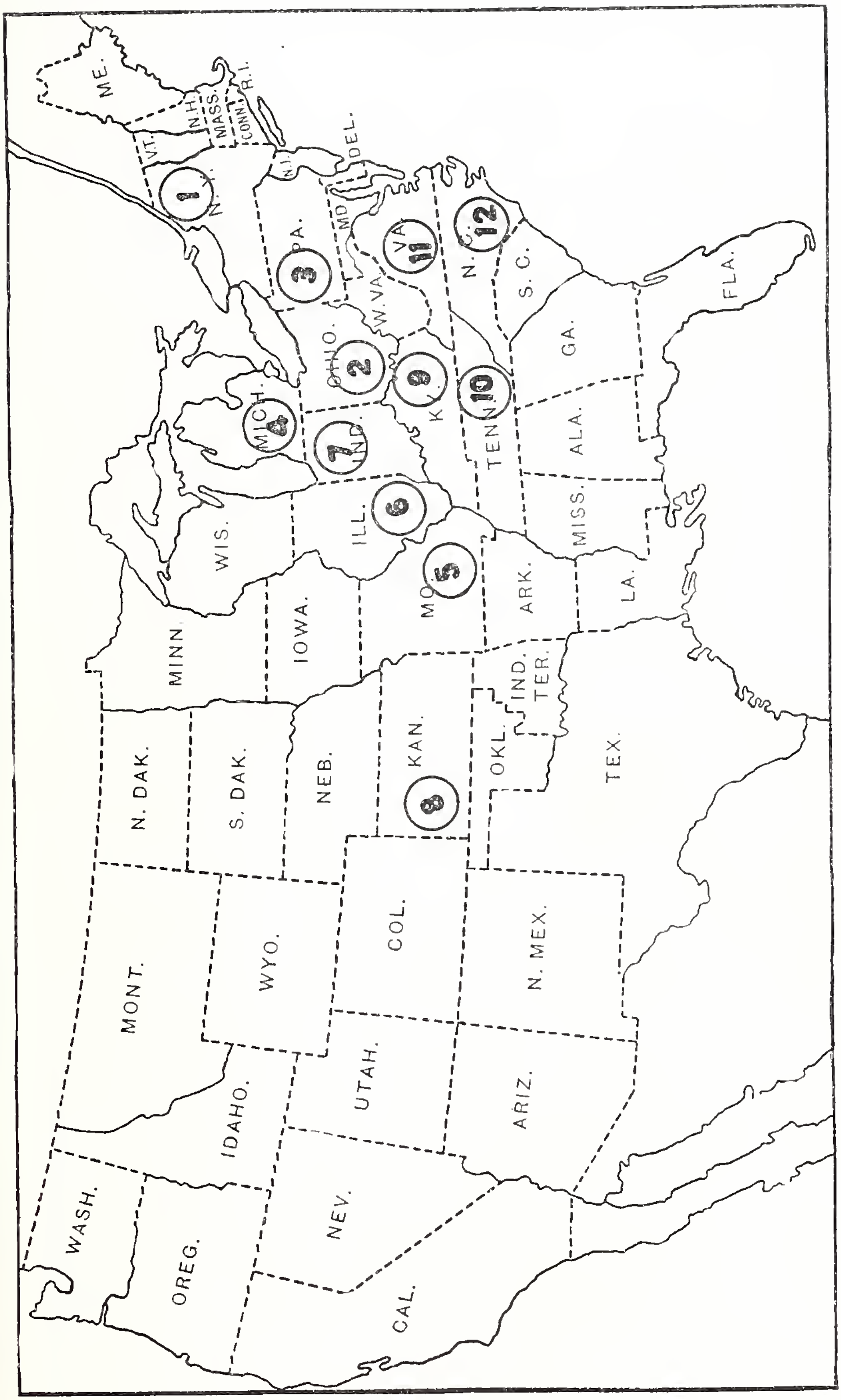


Table 11. RANK OF LEADING APPLE PRODUCING STATES IN NUMBER OF BEARING TREES.

(Census of 1900)

Bearing Trees Rank	 State	No. Trees	Production Rank, 1899
1	Missouri	20,040,399	9
2	New York	15,054,832	1
3	Illinois	13,430,006	5
4	Ohio	12,952,625	3
5	Kansas	11,848,070	16
6	Pennsylvania	11,774,211	2
7	Michigan	10,927,899	6
8	Kentucky	8,757,238	10
9	Indiana	8,624,593	7
10	Virginia	8,190,025	4
11	Tennessee	7,714,053	11
12	Arkansas	7,486,145	20

Chart XII:—Rank of leading apple producing states in number of bearing trees. Census of 1900.

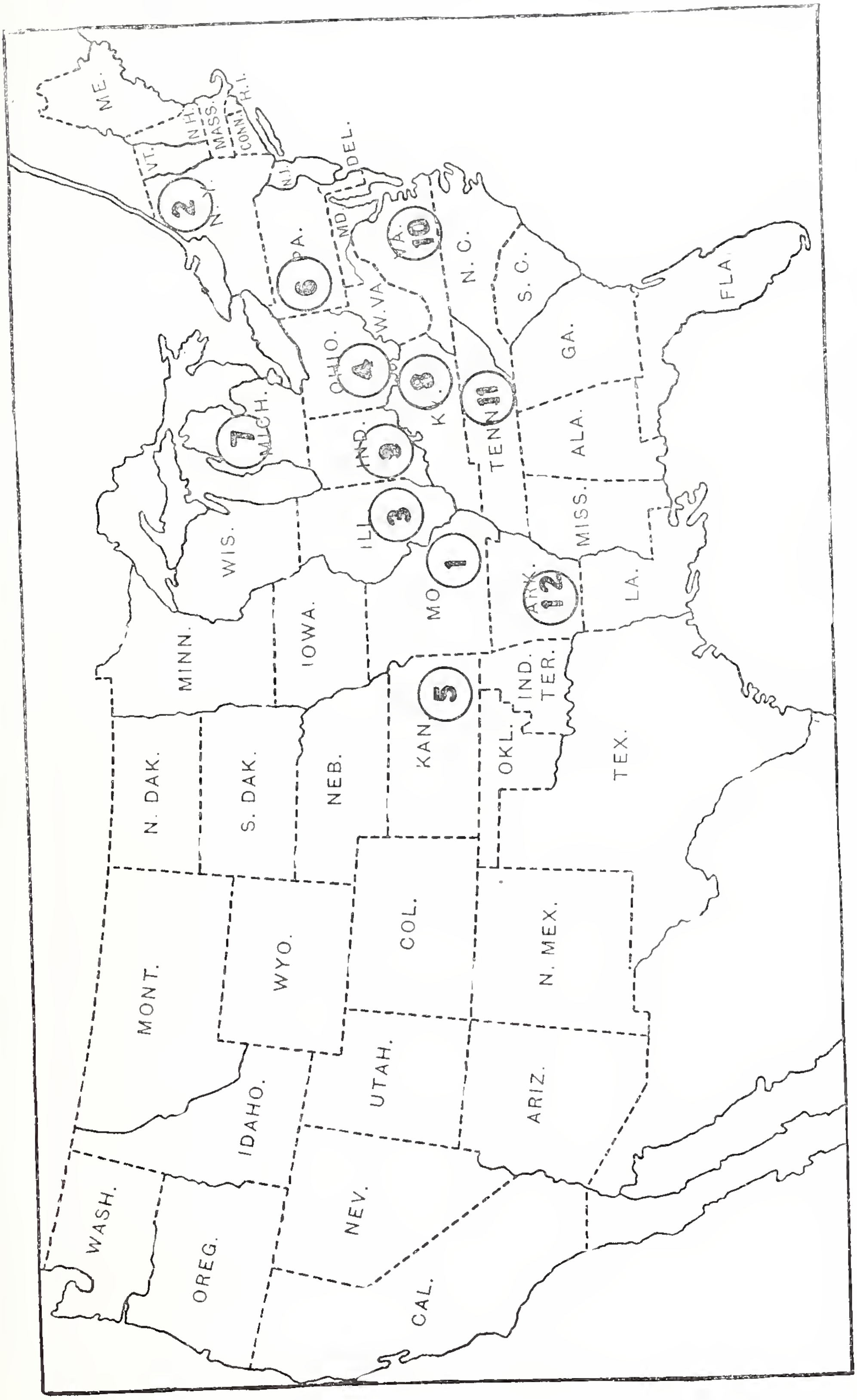


Table 12. RANK OF LEADING APPLE PRODUCING STATES IN NUMBER OF BEARING TREES, IN PRODUCTION, AND IN NUMBER OF NON-BEARING TREES.

(Census of 1910)

Bearing Trees			Production	Non-Bearing Trees		
Rank	State	No. Trees	Rank in 1909	Rank	State	No. Trees
1	Missouri	14,359,673	4	1	Washington	4,862,702
2	New York	11,248,203	1	2	Arkansas	3,940,089
3	Illinois	9,900,627	16	3	Missouri	3,624,833
4	Ohio	8,504,886	10	4	Virginia	3,435,591
5	Pennsylvania	8,000,456	3	5	New York	2,848,515
6	Arkansas	7,650,103	20	6	West Virginia	2,772,025
7	Michigan	7,534,343	2	7	Illinois	2,548,301
8	Virginia	7,004,548	7	8	Pennsylvania	2,501,185
9	Kansas	6,929,673	27	9	Ohio	2,438,246
10	Iowa	5,847,034	6	10	Michigan	2,253,072

Chart XIII:—Rank of leading apple producing states in number of bearing trees. Census of 1910.

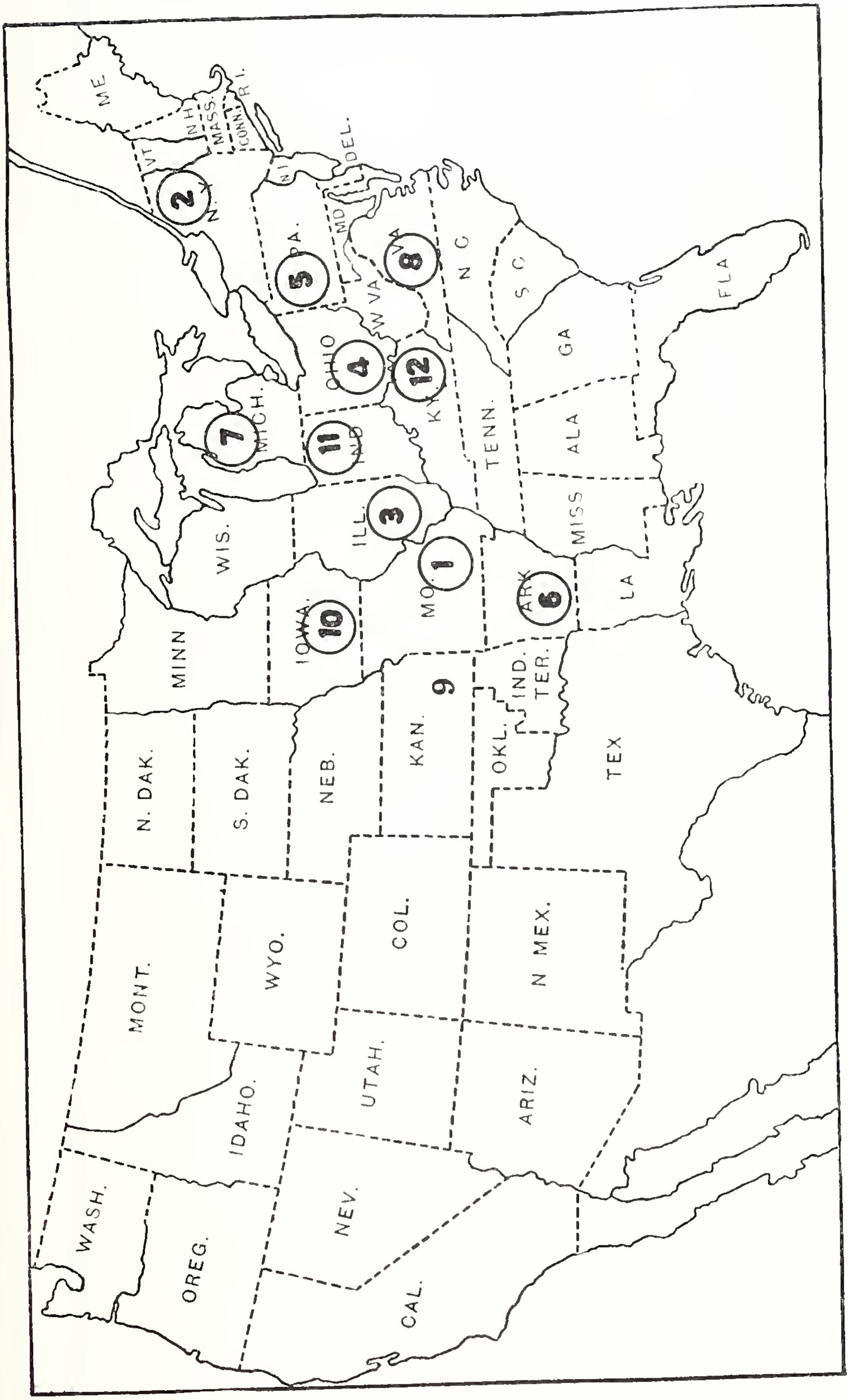


Table 13. RANK OF LEADING APPLE-PRODUCING STATES IN NUMBER OF BEARING TREES, IN PRODUCTION, AND IN NUMBER OF NON-BEARING TREES.

(Census of 1920).

BEARING TREES				NON-BEARING TREES		
Rank	State	No. Trees	Rank in Production	Rank	State	No. Trees
1	New York	9,636,698	2	1	New York	2,932,281
2	Washington	7,964,167	1	2	Virginia	2,857,007
3	Virginia	7,385,277	3	3	Pennsylvania	2,603,516
4	Pennsylvania	6,981,128	8	4	Michigan	2,051,129
5	Ohio	5,970,410	16	5	Ohio	2,047,687
6	Michigan	5,583,326	7	6	Illinois	1,825,886
7	West Virginia	5,554,731	12	7	West Virginia	1,735,126
8	Missouri	5,162,859	9	8	Missouri	1,585,823
9	Illinois	5,112,866	11	9	Kentucky	1,427,408
10	Arkansas	4,074,870	5	10	North Carolina	1,394,588
11	Kentucky	3,742,936	26	11	California	1,143,947
12	North Carolina	3,474,821	17	12	Arkansas	877,376

Chart XIV:—Rank of leading apple producing states in number of bearing trees. Census of 1920.

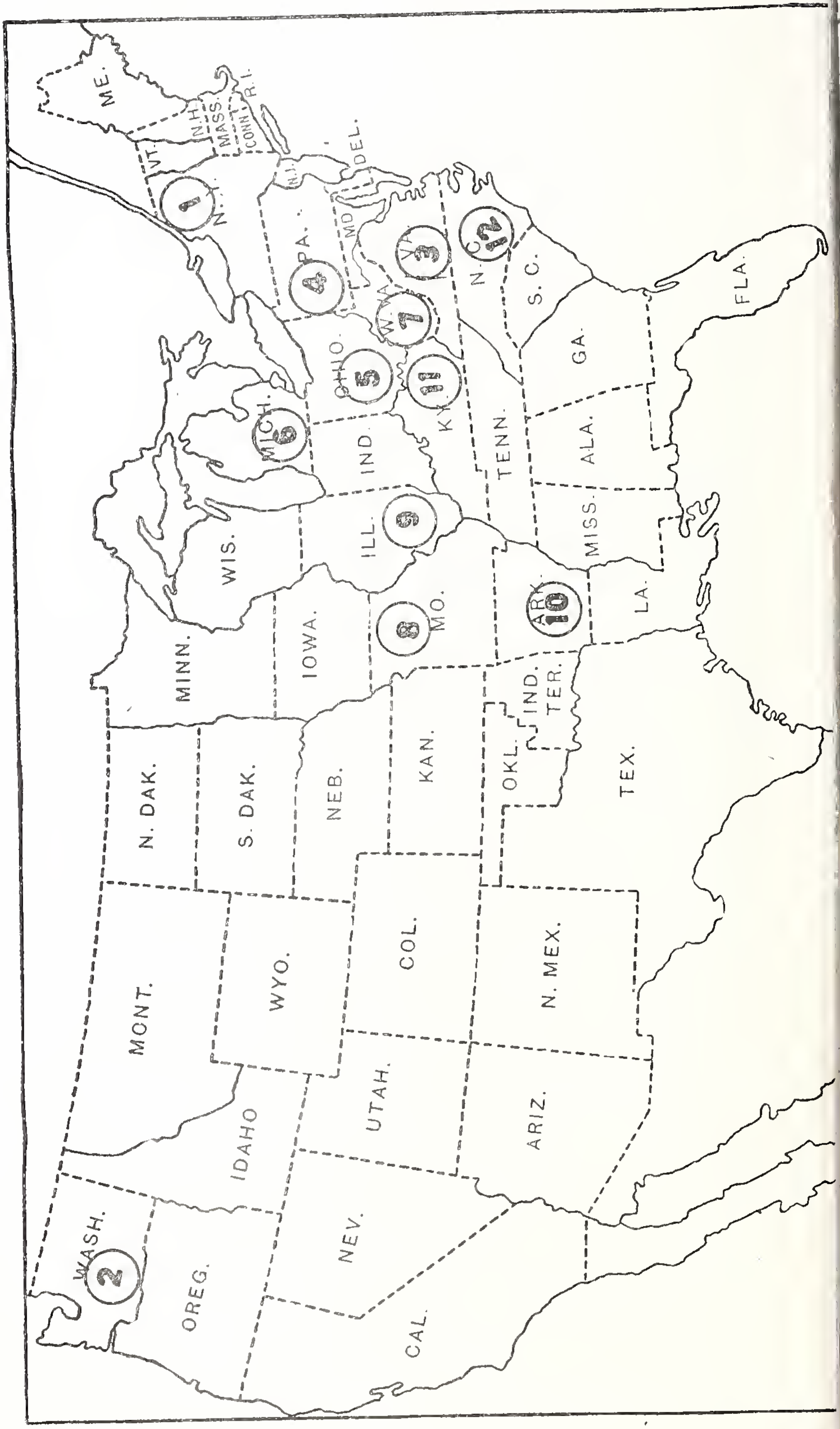
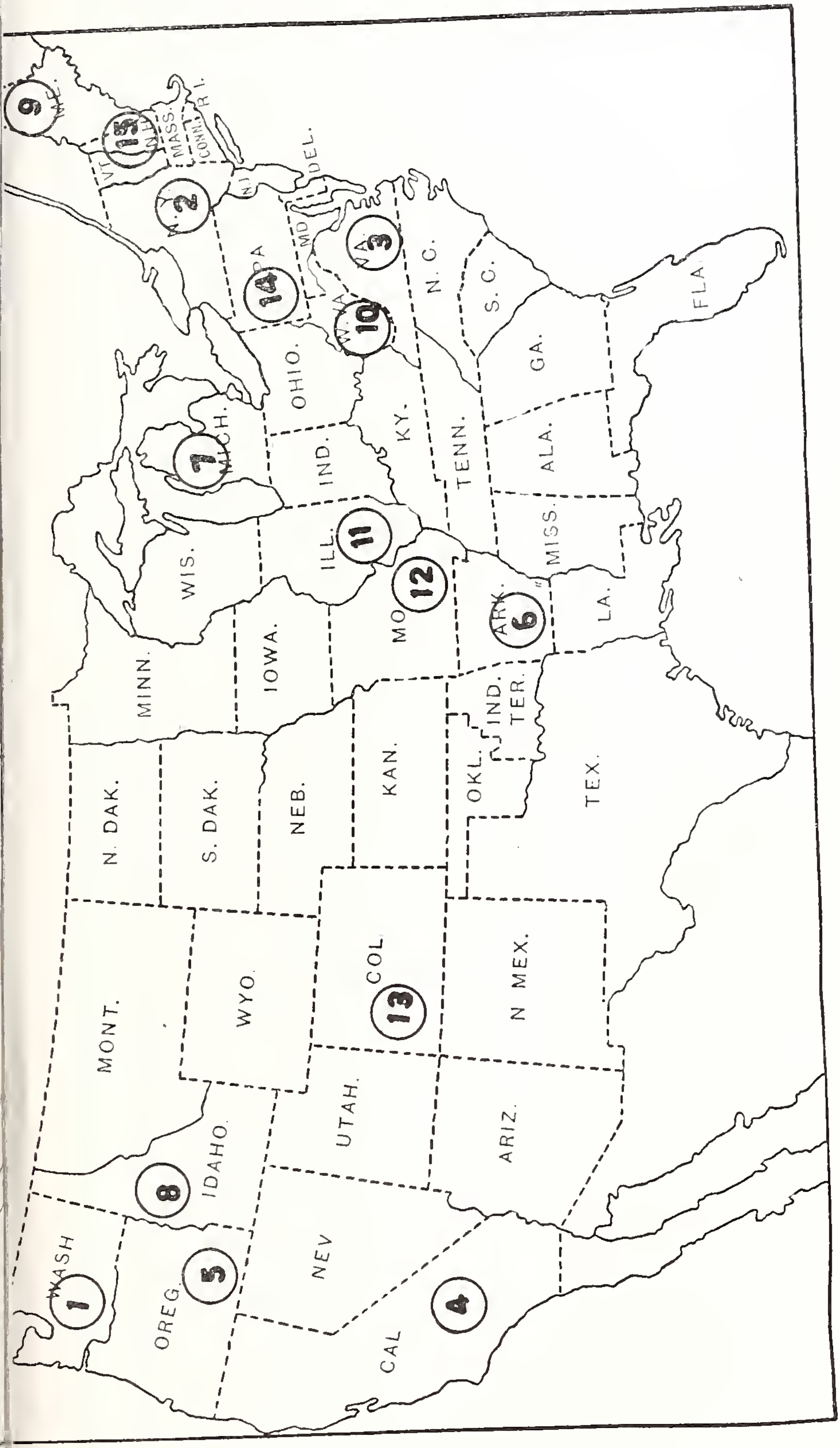


Chart XV:—Carlot shipments of apples, July 1, 1919 to June 1, 1920. Rank of leading states.



CHARACTERISTICS OF APPLE CULTURE IN PENNSYLVANIA.

Few States have fruit regions extending through a greater climatic range or showing more marked diversities than are found in Pennsylvania. For this reason it is seldom possible to talk of the State as a whole, when discussing the growing of any fruit crops. The State can be divided rather easily into five distinct regions. (See Chart XVI).

THE SOUTHEASTERN REGION.

The Southeastern Region extends from the Susquehanna Valley eastward to the Delaware and southeastward from the main foothills of the Allegheny Mountains to the State line and includes the counties of Berks, Bucks, Chester, Delaware, Montgomery, Lebanon, Lancaster, the ~~southern half of Dauphin~~ and the eastern portions of Cumberland and York. It is the least hilly of all the regions although little of it is very level. The gently rolling country affords splendid sites for orchards and the moderate winters and long seasons permit the growing of peaches and grapes as well as the longer season apples. The soils are all residual, made by the weathering down of the native rocks; the soils used for apples are derived chiefly from the sandstones and shales.

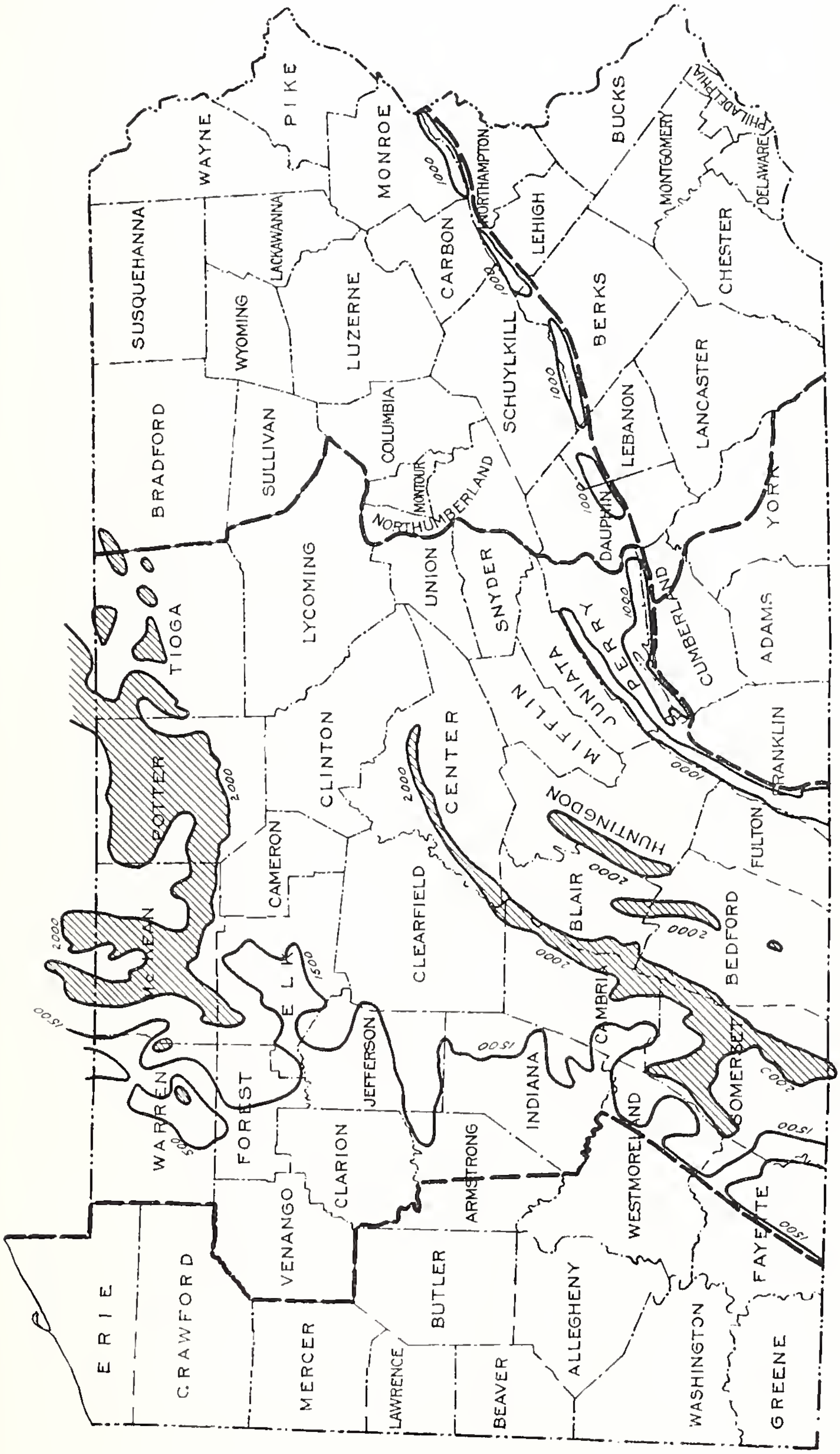
As this was the first region settled in the State, we find here our first fruit plantings. Many famous amateur fruit plantations and nurseries were located in this territory in the early days and because of the fine markets in and near it, commercial fruit growing on a small scale was started very early. The Pennsylvania apple orchard of the first half of the last century consisted of from one to three or four acres, rarely more. The varieties grown were numerous, many of them being seedlings originating in the neighborhood. Of the few that have survived in the commercial orchards of today, Smokehouse is the best known. Among the older trees of that time, some of them from 40 or 50 feet in height, one could find the Pennock, Hoopes, Caleb, Summer Queen, Red Romanite, Long Island Russett and Winter Rambo. Then there was a more recent planting of Gravenstein, Smokehouse, Fallawater, Rhode Island Greening, Baldwin, Indian, Red Astrachan, Ralls, Janet, Golden Russet, Carver, Green's Choice, Jersey Sweet, Gulley and many others. At that time the graded and barreled apples came from New York to supply Philadelphia and the larger towns of this region. The population was mostly in the country and even the farm tenant house usually had one or more apple trees. The farmers made a few barrels of cider, mostly for vinegar and fed the surplus to the hogs. A few loads were put in the cellar or buried under ground and every night before bedtime in winter the family would sit around the fire and each eat his favorite apple.

Few realize the extent to which the splendid demand of the nearby markets has modified the fruit-growing methods of this region. For the period from 1916 through 1920, the only counties lying entirely within this region which had a total apple carlot shipment of over five cars were Berks with 26 cars and Chester with seven. In that time, however, many thousands of truck-loads of fruit have been taken to the local market and sold direct to the consumer. The development of an extensive network of good roads has sent many people directly to the orchard for their fruit. It is not uncommon for orchards of 30 or 40 or even more acres to sell nearly all the crop to auto parties who come to the orchard for the fruit. Such conditions as these are resulting in the planting of more and better fruit and of a wide range of varieties in order to supply the market throughout the season. The wonderful opportunities for local-market sales in this and other regions of the State are shown by Chart XVII. It is not the large cities alone which create a demand for fruit, although frequently they are the only ones which show in published market reports. The many boroughs and small cities which dot the State often are better markets for nearby fruit than Philadelphia or Pittsburgh and few other States combine the possibility to grow fruit and a high percent of urban population better than does Pennsylvania.

The building of new roads and the advent of the motor truck have assisted in opening up new markets for Pennsylvania apples. Within 100 miles of the State's eastern and southeastern borders and exclusive of the State itself, ten millions of people are living in cities and towns of over 2,500 inhabitants. Eventually it will be possible to supply any of these towns directly from our Pennsylvania orchards at a lower cost to the consumer and a higher return to the grower than in most cases under present methods of distribution. If this expansion comes, our growers must make a more careful study of the competing orchards of New Jersey, Delaware, Maryland and Virginia.

Because of the large proportion of young orchards in this region by far the larger part of the apple acreage is under cultivation; but several of the soil types wash badly and are difficult to handle under

Chart XVI:—Showing elevations and five distinct apple growing regions of the State.



this system of management and there is a tendency to seed down the orchards as they come into full bearing.

There is every reason to believe that this region will increase rapidly in relative importance in the production of apples. In general the care of the orchards is considerably above the average and, as so many of the trees are young, the quality of fruit is good. Except for a few small cider mills, no by-products plants exist in this region and the second-class fruit is sold on the market at a good price. More than one-third of the apple acreage has not yet come into bearing. The new plantings are of the best varieties and are well-cared for. The demand from the local market is not nearly met by the local fruit and with so little taken off for commission and handlers' profits the prices are usually satisfactory.

In Table 14 the number of trees in bearing and non-bearing and the rank of each county in the region as compared with the rest of the State is given. These figures are from the Federal Census of 1920, the year the survey was made.[1] A short discussion of some of the more important features of the counties in the Southeastern Region follows:

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[1] In the Appendix will be found a list of all the counties of the State giving the number of trees not of bearing age, the number of bearing age and the production in 1919.

CHART XVII:—PENNSYLVANIA AS A LOCAL-MARKET STATE

● Cities and boroughs over 10,000 population.

• Cities and boroughs from 2,500 to 10,000 population.

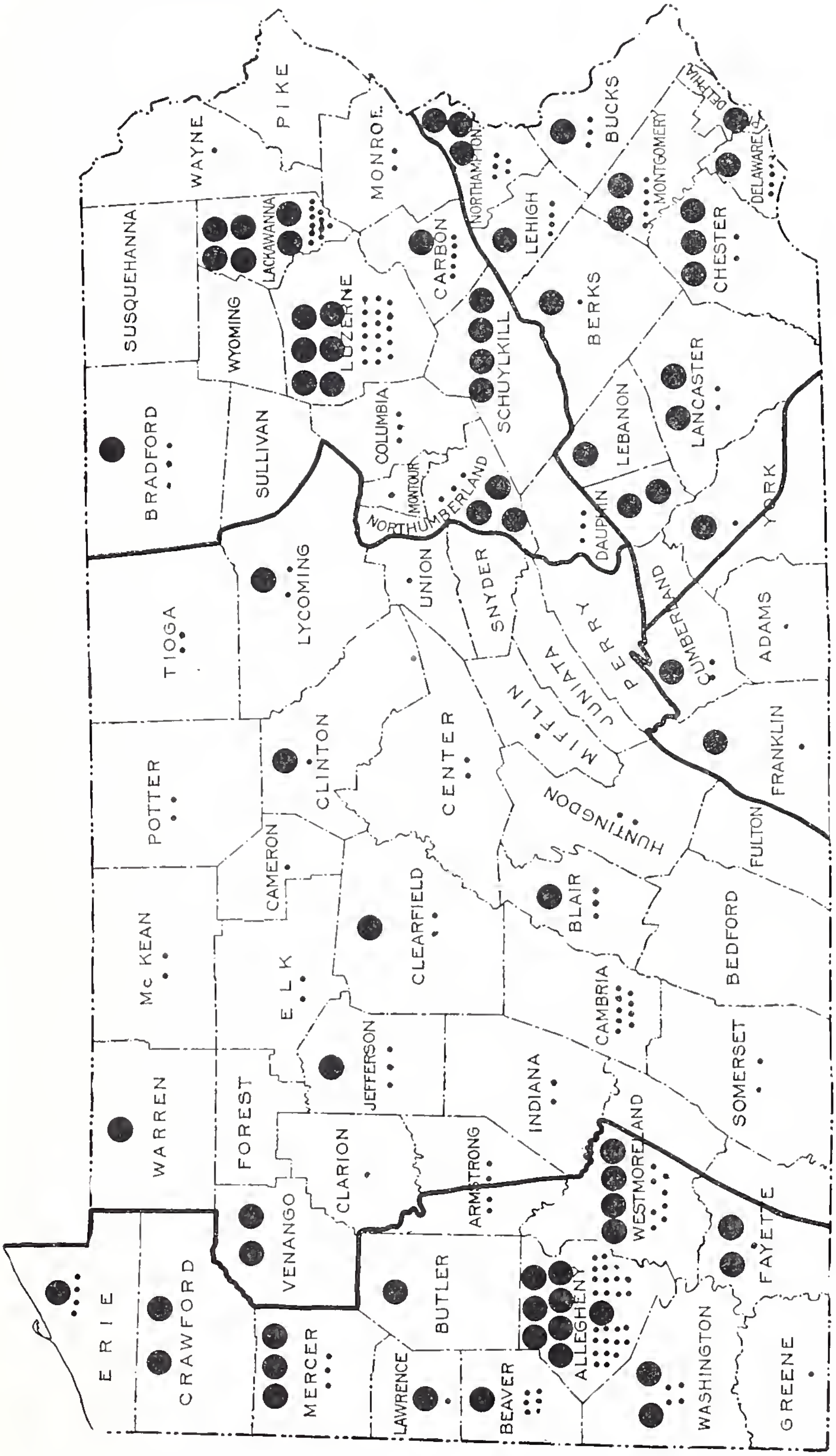


Table 14. NUMBER OF APPLE TREES: SOUTHEASTERN REGION.

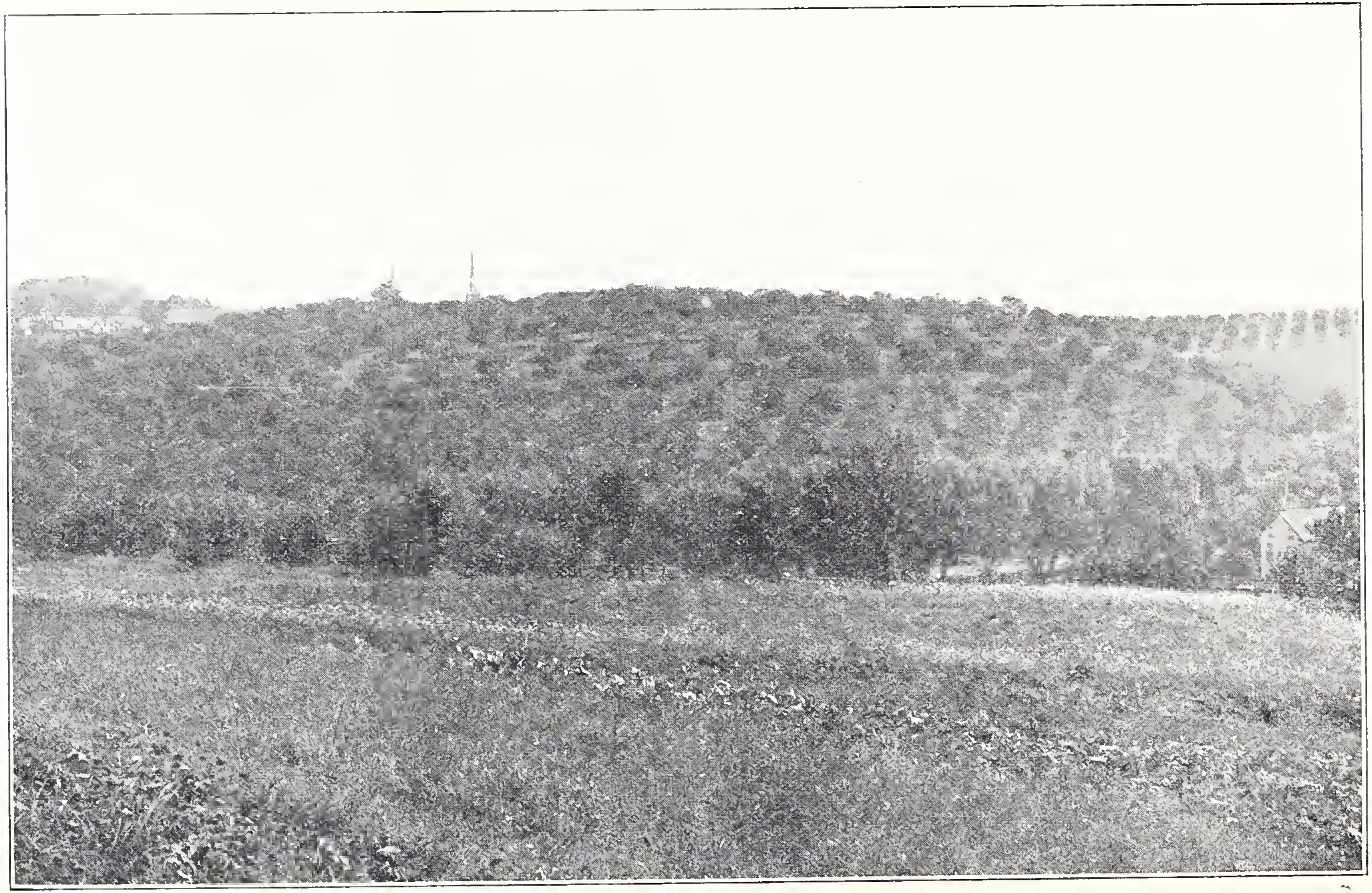
(1920 Census)

Counties entirely in region	Trees Bearing	Trees Non-Bearing	Total	Rank in total number trees.
Berks	181,309	96,869	278,178	5
Bucks	120,980	65,844	186,824	16
Chester	122,331	67,421	189,752	15
Delaware	23,854	17,814	41,668	61
Lancaster	124,431	98,191	222,622	7
Lebanon	54,695	26,892	81,587	52
Lehigh	67,400	39,722	107,122	43
Montgomery	98,365	65,187	163,552	24
Northampton	65,178	25,586	89,764	50
	857,543	503,526	1,361,069	
Counties partly in region				
Cumberland	106,791	77,271	184,062	18
Dauphin	91,799	48,501	140,300	32
York	234,526	141,938	376,464	2
Total entirely or partly in region.	1,290,659	771,236	2,061,895	

Berks County: At present Berks and Lancaster are the leading counties in total acres of apples in the Southeastern Region but the fruit in these counties is rather scattered and both Montgomery and the Chester-Delaware territory give one the impression of being more intensive apple areas. Berks is a very typical Pennsylvania fruit county. A strip of splendid limestone soil runs northeast nearly through the center of the county and the rolling hills which bound this on the north and south are excellent orchard sites. The first ridge of the Berks shale soil overlooking the valley on the north side is well liked for apples and other ridges back of this and above the Schuylkill valley are used, as in the vicinity of Hamburg where several large orchards have been planted. There are other orchard districts on the south near Gouglerville, Geigertown and Boyertown.

Reading is a splendid market and orchards in the southern and southeastern part of the county, whenever the Reading market is supplied, ship into Lancaster County or into Philadelphia. Orcharding here is largely only a part of the farm industry and the fruit goes to market along with potatoes, corn, cabbage and many other general crops.

Bucks County: Twenty years ago Bucks County was the second in this region in number of bearing apple trees but the old trees are



A BERKS COUNTY ORCHARD.

going out. Since this county has failed to keep up its planting, it probably will drop below Montgomery in the near future. There is a larger proportion of the county where the drainage is unsatisfactory for apple growing. This probably has influenced apple culture to a considerable extent and placed most of the better orchards in an east-to-west band through the central part of the county and along the hills bordering the Delaware Valley. The best orchards now are under 20 years of age. There are a number of growers who realize the value of the excellent local markets in and near the county and know that these are not nearly supplied by the Bucks County orchards, so there should be an increase both in interest and in production in this area.

Chester and Delaware Counties: These should be considered as a single region as far as fruit is concerned. Both are made up of winding valleys outlined by gentle hills whose sides and tops are excellent orchard sites and both are largely composed of the Chester and Manor soils well adapted to fruit growing. A considerable portion of Delaware is too near the industrial cities of the Delaware Valley for the best types of agriculture to flourish but in the northwestern part some good orchards are found. In Chester County the orchards are scattered thinly over most of the county, but are somewhat more numerous in the eastern portion. There are no better local markets in the State than are those available to these counties and all orchards are planned for this type of marketing. In many cases apples are raised with peaches and so far the attention has been that given to the peaches, clean cultivation, with a light weed cover-crop for the winter; the apples are sprayed when the peaches are sprayed. Commercial fertilizers have been used, mostly acid phosphate. No manure and very little nitrogen has been used. The peaches have proved such a good crop that they, rather than the permanent apple trees have received the attention. This being the case, the land is somewhat depleted by the time the peach fillers are cut out. The orchards are now under cultivation but as soon as the peaches are out they probably will go into sod to prevent washing, as these soils erode easily.

Lancaster County: Fifteen and twenty years ago Lancaster County produced practically all the apples consumed in the local markets. Most of the farms had small orchards of mixed varieties and from these the nearby towns were supplied. Now the situation is completely changed. San Jose scale and neglect have killed most of the farm orchards and one is more likely to find Oregon or New York apples on the Lancaster market than home-grown fruit. A few men have had the foresight to see the splendid opportunity for apple growing in Lancaster County and new orchards are being developed. The county now ranks seventh in total number of apple trees. Many times over the present yield could be sold in Lancaster and the other towns of the county without danger of flooding the market. This is true not only of apples but also of peaches and all other fruits.

One of the interesting points connected with apple growing in Lancaster County is the fact that men whose farms are situated on the limestone soil of the fertile valley running east and west across the county and who are growing corn, wheat and tobacco, do not seem to be interested in apple growing, (except in a few cases). The main apple orchards are found on the poorer soils not so well adapted to diversified crops. Some of the best orchards are situated on hillsides in the rougher areas of the county. Here the orchards have excellent air and water drainage and, possibly because of the poorer land, the fruit takes on a wonderfully attractive color. Those men who have the inclination to grow fruit and have lands situated on these hillsides may well consider extensive planting of apples and peaches.

Lebanon and Dauphin Counties: This county and that portion of Dauphin which is in this region are very similar to Berks in their apple industry but the area used for fruit is more limited. The limestone valley is broader here than in Berks and the apple plantings are chiefly on the first ridges of the shale soil to the north of the valley. In the vicinity of Bunker Hill, along the railroad running north from Lebanon, there is quite a collection of orchards but most of them are only five to ten acres in size. The line of hills marking the southern boundary of Lebanon County is a continuation of South Mountain which forms the southern boundary of the Cumberland Valley. Orchards are scattered among these hills.

Lebanon and Dauphin county fruit is sold on the local markets, chiefly in Lebanon city and Harrisburg, or in a number of towns between these two cities. These are good markets and are not sufficiently supplied with good apples.

Lehigh and Northampton Counties: These are very similar to Lebanon County. A broad limestone valley runs through them in a northeastern direction with ridges and rolling hills to the north and south. Allentown, Bethlehem and Easton afford splendid markets and the local fruit does not nearly meet this demand. A considerable increase in planting of larger, local-market orchards in this region is to be expected. Already three or four such orchards are located near Allentown and are proving very profitable.

Montgomery County: Montgomery County lies largely in the valley of the Schuylkill and its tributary streams, particularly the

Perkiomen River. The elevations are low—seldom over 200 feet but rising from the valley bottoms and along the edges of the valleys are well-rounded hills 100 to 200 feet above the surrounding land. It is on these hills that many of the commercial orchards are located.

The predominating agriculture is mixed farming—wheat, oats, corn, potatoes and some dairying. Fruit is considered a minor crop. Many farm orchards are located here but they are small and scattered, receiving little care.

The larger commercial orchards are recent additions to the fruit industry, the oldest not being much over 15 years. The nearness to so many desirable markets convinced a few pioneer growers that the large, local-market orchard would pay and now a number of very fine young orchards just coming into bearing are found. These are usually cultivated and receive good care. The crop is largely sold on the nearby markets or to auto parties who come to the orchard.

Peaches formerly were an important crop but yellows have nearly wiped them out. They evidently were not given the best of care and but little renewal pruning.

The county offers unusual opportunities for the fruit grower because of its fine orchard sites, its proximity to markets and its mild climate which permits the growing of a variety of fruit.

York and Cumberland Counties: The northern and eastern portions, of these counties in the neighborhood of Carlisle, Harrisburg and York City are included in this region because here the fruit growers sell most of their crop on the local markets while in the rest of these counties the fruit goes to distant markets in carlots. Many of the local-market growers have not given their trees needed care and as a result the fruit is often of poor quality. The use of auto trucks is permitting some of the larger commercial growers to send part of their crop to the valley towns and the increased competition should materially improve the fruit.

Excellent fruit can be grown and an increasing interest in spraying and pruning promises greater production. With increased production there must be better grading and packing and more ample storage space must be provided.

THE NORTHEASTERN REGION.

The Northeastern Region lies north of the Southeastern Region and east of the main Susquehanna Valley and of the counties of Lycoming and Tioga. This is a region of high plateaus and fertile valleys with rough and sometimes almost precipitous sides. The orchards are either on benches on the valley sides or on the rolling hills of the pleateaus. Their elevations are from 800 to 2,000 feet.

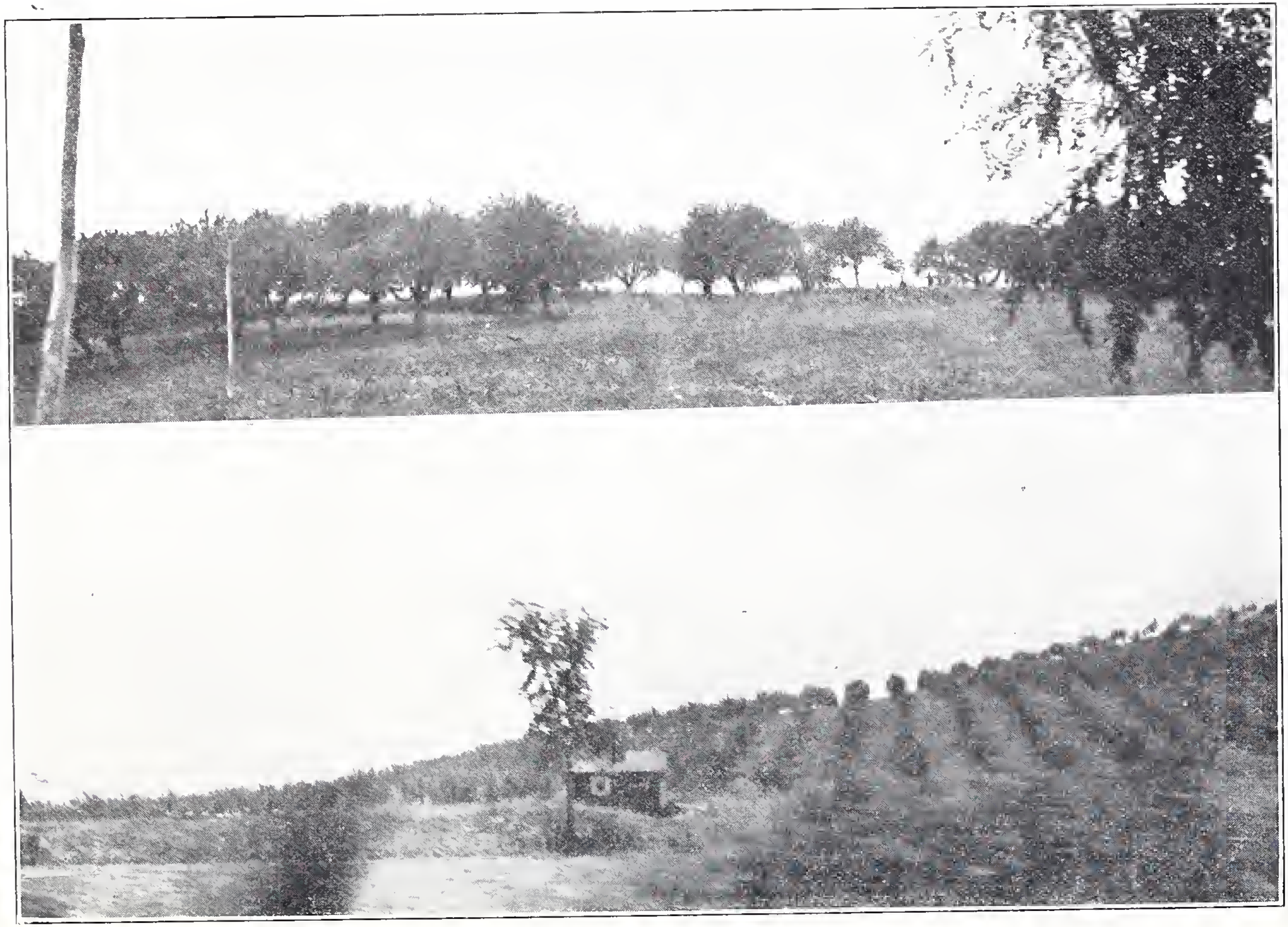
The climate is severe enough that peach growing, even in the more favored locations, is uncertain; and at the higher elevations the winter temperature at times is sufficiently low to cause injury to apples.

The east branch of the Susquehanna formed the main highway for the colonization of this territory and of parts of southern New York and so the valley was early settled. Even before this colonization took place the Indians had scattered plantings of seedling apples throughout the valley. The first period of commercial planting found the farmers very ready to undertake apple growing because of the success of the early home plantings. Many orchards of considerable size were planted during and before the sixties. The wisdom of this planting has been shown by the vigor and production of these trees even today. When the planting boom began about 1900 several large orchards were set out in this region, but the presence of so many old trees kept the enterprise from becoming as strong here as farther to the south. The plantings during the last ten years have been light.

This region covers both local-market and carlot shipping territories. Luzerne, the most heavily planted county of the group, has nearly the smallest record of carlot shipments. Except in years of heavy crops, practically all the apples within 20 to 25 miles of Wilkes-Barre, Scranton, Pittston and Carbondale are trucked into these cities or the nearby mining towns. The many manufacturing cities and town of Northumberland, Schuylkill and Carbon Counties supply excellent local markets. On the other hand, the northern and eastern tier of counties and also most of Wyoming County are situated too far from good markets to permit of trucking, and as a result most of the fruit, usually in bulk shipments, goes out by the railroads.

These differences have had their effect upon the younger plantings. In Susquehanna, Bradford and Wyoming, large orchards of few varities have been put out by individuals or by orchard companies. In counties with local markets the orchards contain many more varieties, are planted with relation to auto roads rather than to railroads and practically none are owned by orchard companies. Of the older orchards, those near good markets are given fair care, while those in the outlying counties are going out fast because of lack of care.

It is the exception to find cultivated orchards in this region but among the men who make much of their living from fruit it is the custom to fertilize the sod orchards regularly. The usual application to old trees is15pounds of a mixture one-third of which is nitrate of soda and two-thirds acid phosphate. This particular method of management seems admirably adapted to the region. The



THE OLD ORCHARD AND THE NEW. ON THE HILLS OF BRADFORD COUNTY.

trees reach large size and are vigorous and fairly regular in production. The heavy bluegrass and timothy sod seems to keep the soil in good condition and prevents washing. In spite of the sod, field mice do not seem to be as serious as in most places in the State.

Until they develop better methods to avoid glutting the markets in years of full crops, it is doubtful whether Luzerne County growers will increase their plantings to any extent as their markets now are fairly well supplied under normal conditions. This is not the case with Schuylkill and Carbon and to a less extent with Lackawanna and Northumberland counties. Increased planting and more attention should be given to the old orchards in these counties to insure an increase in production.

The counties of the eastern and northern tier, especially Susquehanna, Wayne and Monroe, have such excellent rail connections for New York and Philadelphia and such a short haul that they are very well situated for carlot shipping. Already a number of fine young orchards have been planted with this feature in mind, although some of the growers expect to be able to send fruit to market by truck even when New York is the destination.

Table 15 gives the number of apple trees of bearing and non-bearing age in the counties of this region and the rank of each county as compared to the others of this State in total number of trees.

Table 15. NUMBER OF APPLE TREES: NORTHEASTERN REGION
(1920 Census)

Counties entirely in region	Trees Bearing	Trees Non-Bearing	Total	Rank in State in total number trees
Bradford	136,858	34,198	171,056	22
Carbon	42,178	21,067	63,245	54
Columbia	96,624	37,882	134,506	36
Lackawanna	101,420	39,356	140,776	31
Luzerne	165,133	90,829	255,962	6
Monroe	59,175	19,301	78,476	53
Montour	19,727	12,099	31,826	62
Northumberland	101,106	36,208	137,314	34
Pike	23,831	4,529	28,360	64
Schuylkill	125,828	54,903	180,731	19
Sullivan	33,998	14,049	48,047	57
Susquehanna	158,674	26,702	185,376	17
Wayne	178,596	35,336	213,932	10
Wyoming	80,450	63,609	144,059	29
	1,323,598	490,068	1,813,666	
Counties partly in region.				
Dauphin	91,799	48,501	140,300	32
Total entirely or partly in region	1,415,397	538,569	1,953,966	

Bradford County: The Susquehanna River cuts through Bradford County from the middle of the northern border to the southeastern corner, and this valley has modified the fruit growing of the region to a considerable extent. The valley-sides and benches afford desirable orchard sites and the Lehigh Valley Railroad, which follows the river, facilitates the shipping of fruit. A branch of the Pennsylvania Railroad runs through the north and south valleys on the western part of the county and several large commercial orchards have been started on the slopes of these valleys. Other commercial plantings are found south of Towanda near New Albany.

The younger orchards usually are well kept and promise to be profitable investments but they are not sufficiently numerous to replace the many old and neglected home orchards that one finds back from the railroads and which are rapidly going on the brush pile.

The varieties grown are those usual in the northern tier: Baldwin, Rhode Island and Spy, with a host of miscellaneous kinds in the older orchards, and Stayman, McIntosh, Jonathan and Wagner also are found in the younger plantings.

Most of the trees are in sod and little fertilizer is used but in the home orchards the grass is usually pastured whereas in the commercial orchards it is cut and left.

The larger part of the fruit crop is marketed in the county as fresh fruit or processed as cider or apple butter, but some is shipped in bulk by local shippers or buyers who come in when there is a big crop.

The number of commercial orchards will increase but slowly since the grower must know how to find a distant market and how to prepare his fruit for shipment if he is to succeed; however there should be a rapid increase in the number of home orchards planted in order to supply the outlying farms with necessary fruit. If this is not done many Bradford County farms must buy apples from the commercial growers or from the grocer who ships them in.

Carbon and Schuylkill counties: These counties should be considered together because of their similar topographic and economic conditions. Both are mountainous and in both coal mining overshadows agriculture. In Carbon the amount of land available for agriculture is small, the valleys usually being narrow with precipitous sides, but good local markets have encouraged a few to care for the old farm orchard and even to increase planting. This is especially true in the neighborhood of Lehighton and Slatington. The financial returns have been so satisfactory that we may expect to see others renewing the old trees or planting new areas.

Schuylkill County has a number of fine valleys and along the edges of these are some excellent orchard sites. Many older orchards are scattered throughout these valleys and some younger orchards of fair size are located in the vicinity of Orwigsburg and in the upper Lykens Valley. The large mining population gives a good market and there is renewed interest in fruit growing. The county now ranks 19th in Pennsylvania in total number of trees.

Columbia, Northumberland, Mountour and the northern half of Dauphin County: This area forms a small unit within the Northeastern Region. Agriculture is largely confined to the valleys but the presence of the two branches of the Susquehanna and their numerous tributaries has resulted in much rich bottom land for general crops, and the more gentle slopes of these valleys afford fine sites for orchards. There are a number of good local markets nearby and improved roads make it easy to reach them. In Columbia and Montour the old river terraces above the East Branch are favorite sites and a number of orchards of fair size are found but they do not receive the care they should. In spite of this, the growth is good and crops are fair. Most of this fruit goes to Berwick.

In Northumberland, the orchards are scattered, are mostly of the old farm-orchard type and they receive very little care. A few younger orchards of from one to five acres are located on the hilltops and upper slopes where the soil type is chiefly Upshur. These are very desirable locations and the growth of the trees is satisfactory in spite of indifferent care. Some peach orchards in the region have received fair care and look promising. The planting of new orchards in Northumberland does not seem to come up to the apparent opportunities.

Only a small amount of fruit is grown in the northern part of Dauphin County. The Allegheny Mountains intervene and the few valleys are narrow. Nevertheless successful apple-growing is conducted on the mountain slopes.

Lackawanna County: The three central counties of Luzerne, Lackawanna and Wyoming cover the most intensive fruit-growing area of this region. Of the three, Lackawanna has the smallest acreage, especially of young trees. The soil of the county is chiefly Volusia silt loam or stony loam. The rock is near the surface and the slope is often too steep for cultivation.

The apple orchards, aside from the few commercial ones, are old and receive very little attention. They are grown in connection with general crops and dairying and mostly are in a thin sod from which the hay is usually removed. A few commercial orchards of considerable size which receive good care and which are profitable investments are found. Considering the little attention given to the fruit, the orchards are remarkably free from diseases and insects.

Among The varieties grown are chiefly winter apples such as Banldwin, Spy, and Greening, and some Tomkins King. Every orchard has also a dozen or more of the old fashioned apples. Other varieties found doing well are McIntosh, Rome, Stark, Delicious and Stayman. Many men like the Wolf River and other large red apples as both the Scranton and Wilkes-Barre markets demand a red apple. Practically no fruit is shipped out of the county. About three-fourths of the fruit is sold to grocers or directly to the consumer. The rest of the commercial crop is sold through wholesalers. The bushel slat crate is the package most commonly used.

The possibility for apple growing, judging from the few, well kept orchards, is good. The markets are not so well supplied with local fruit as are those of Luzerne County and much fruit is shipped in by rail or by long truck haul. South and east of Scranton the county is very rough except near the Erie and the Delaware, Lackawanna and Western railroads, but some good locations may be had northwest of both Scranton and Carbondale where orchards could be placed with good roads available to desirable markets. At present the county is only thirty-first in the State in total number of trees and the number of young trees is not sufficiently large to increase this rank very much.

Luzerne County: This county ranks sixth in the State in number of trees, and the condition of its old trees and the number of its young trees indicate that it will hold about the same rank for some time to come. In topography the county shows considerable variation. The Susquehanna River which nearly bisects the county, northeast to southwest, lies ina rather narrow valley with abrupt sides. Back from Wilkes-Barre on the south side of the valley lies Nescopeck Mountain, one of the northern ranges of the Appalachians and where the land is not rough and stony it is usually too poor for good agriculture, but a few orchards are located along the sides of some of the small valleys lying between Nescopeck Mountain and the Susquehanna River. North of the river valley, the central part of the county is a high plateau cut into gently rolling hills by small streams. The northeastern end of this plateau, back of Pittston, is much more rugged and in some places the land is too rough for agriculture. On the western part of the plateau back from Shickshinny, the land also is broken into rough hills. Most of the county has been sufficiently glaciated to put the soil in the Volusia series but on many of the higher hills the glacial deposit is too thin to cover entirely the red loams and clay loams which come from the native shales and sandstones.

Along the Susquehanna valley-sides for considerable distances back and at varying elevations are old terraces left when this valley was the outlet for the glacial waters. These are gravel or sandy to gravelly loams. The level areas are sometimes a half mile to several miles wide, or may be much narrower and considerable cut up by post-glacial drainage from the higher hills. The first and second bottom soils are largely used for truck in the vicinity of the towns but away from the towns the upper terraces are frequently used for fruit growing. Orchards are found on both sides of the river and these locations are promising because of their splendid air and water drainage. Here many of the orchards are cropped and receive applications of fertilizer or manure. Most of the orchards are 20 to 30 years old or older. North of the river in the vicinity of Muhlenburg, the hills are more or less steep and the valleys narrow. A number of small orchards are found here but primarily it is a general farming region. Northeast of this in the vicinity of Sweet Valley and Pike's Creek, lies a section where fruit is one of the main crops. The orchards are considerably larger and in a number of cases the grower relies almost entirely upon fruit for his income. Most of these orchards are in good condition. They are nearly all in sod but the growers use fairly heavy applications of commercial fertilizers.

To the northeast lies another region in the vicinity of Lehman, Dallas and Ruggles. Here the hills are less steep and the country is not so cut up by narrow valleys. This is one of the best fruit sections in the county and the orchards are of good size and receive good care. The excellent roads into Wikes-Barre and other valley towns have aided in building up this region.

In the vicinity of Orange and extending east and south toward the river, the hills are considerably steeper and the land less valuable for general agriculture. The hill-tops and the more gentle slopes have proved to be good orchard sites and, as field crops are of only minor importance, fruit has been planted rather heavily, especially by a few commercial growers who depend entirely upon fruit-growing for their income.

Young orchards usually are cropped and thus receive cultivation, but nearly all of the older orchards are in sod and the hay is left in the orchard. It is a fairly general practice to use nitrate of soda and acid phosphate.

A radius of twenty-five miles from Pittston includes a population of close to a million people. This condition naturally creates a local demand for fruit that has shaped the progress of fruit growing in this region. Second quality fruit sells well and in many of the markets, so long as the apple is red, there is little choice of variety. The fruit is taken to market in the bushel slat-crate and either sold

A TYPICAL BALDWIN APPLE TREE IN WYOMING COUNTY.

to the grocer or huckstered through the town. Because of these marketing conditions, the orchards usually contain a wide range of varieties, Baldwin, Spy, Stark, Ben Davis, and McIntosh being the most common. The trees receive a minimum of spraying yet the fruit is reasonably clean. Most growers have some sort of storage space on the farm and market their crops throughout several months.

Wyoming County: Some interesting contrasts are presented in this county. The southern and southeastern sections are located sufficiently near the Scranton-Wilkes-Barre region to permit a considerable quantity of the fruit to be trucked, but north and west of Tunkhannock nearly all of the fruit is shipped by rail. The county here is very largely made up of broad-topped hills with considerably gentler slopes than obtain in much of Lackawanna County. In the Susquehanna Valley are found level areas of sandy or gravelly soil deposited during the time the glacial drainage of much of New York State flowed through this valley. Occasional orchards are found on these level locations but most of the orchards are on the slopes or even on the tops of the lower hills. Commercial orchards of considerable size are located in the vicinity of Center Moreland and Noxen, in the river valley around Falls and in toward Lake Winola and on the hills which form the Susquehanna Valley sides from Tunkhannock to Meshoppen. Small farm orchards of from a half acre to two acres in size are scattered throughout the county.

The greatest drawback to fruit growing in the county is the difficulty of securing a good market. Buyers do not make a general practice of coming into the territory and when they do come they expect to get the fruit at a price much below the ruling market price. Most of the growers maintain too small an acreage to make it worth their while to hunt up a distant market and while the county is admirably adapted to the growing of apples, the old orchards are badly neglected and are rather rapidly going out. It is only with the advent of the large. commercial orchard during recent years that the possibilities of the county have been apparent.

The small orchards, practically all are in sod, seldom sprayed and more apt to be pastured than to receive fertilization. On the other hand the few large, commercial orchards in the county are given excellent care and usually are under cultivation.

Only a small amount of fruit is grown in Pike and Sullivan counties and the survey was not extended into these regions.

Susquehanna County: There is considerable similarity between Susquehanna and northwestern Wyoming. The smaller orchards scattered throughout the county are in sod and usually neglected and if any fruit is sold from them it is in bulk. Most of the fruit from these trees is used fresh on the farm or made into cider and apple butter.

The larger old orchards generally are in sod, frequently receive some fertilization and usually are pruned. Spraying is seldom thorough enough to produce clean fruit in years of severe scab attack but diseases and insects are not as troublesome as in the southern and western parts of the State and so the less intensive methods give a higher proportion of good fruit.

The excellent transportation furnished by the main line of the Delaware, Lackawanna and Western Railroad and the nearness to Scranton markets have resulted in starting a modern commercial orchard industry in this county that promises to keep up the yield but which has not enabled the county to maintain its record of first place in the number of bearing apple trees in northeastern Pennsylvania which it held ten and twenty years ago. In the last ten years a number of orchard companies have been organized in the county and have planted orchards of considerable acreage. In addition to the old standard sorts, Stayman, McIntosh, Jonathan and Wagener are being planted. These orchards have been given good care and should become profitable investments.

In the better orchards the fruit is barreled and shipped out, but second-grade fruit is sent loose to Binghamton, N. Y., and down into the coal regions, while some cars of bulk apples are forwarded to more distant markets.

Wayne County: Wayne ranks next to Luzerne in total number of apple trees in this region but it owes its position almost entirely to the large number of old trees in the numerous small orchards, in the county. The northern tier of counties has been much influenced by the history of fruit growing in New York State and the same boom which led to such heavy planting in western and central New York in the 60's and 70's also led to the planting of large numbers of farm orchards in this part of Pennsylvana. In many ways these farm orchards have fared better than those of southeastern and northwestern Pennsylvania and a much larger proportion are still bearing profitable crops. Here again marketing difficultues have been the chief cause of the present decline in fruit growing. Three railroads cross the county, furnishing excellent connections with New York and Philadelphia, yet the growers have done little shipping and most of the fruit that goes out has been picked up by buyers at a low price. Probably more farm orchards are found in the Lake Ariel region than in any other similar region in the county. These plantings run from one to four or five acres and usually are from 30 to 40 years old. They receive little care but the trees are vigorous and the fruit is fairly clean. Some of the fruit is trucked into Scranton but the roads are not good and it necessitates a haul of from 20 to 25 miles. Frequently a buyer picks up a few cars of bulk stock, 15 having been sent out of Ariel in 1916. These orchards are largely planted on Lackawanna soils. The elevations are not over 1200 to 1500 feet, and winter injury is not a serious matter.

Moosic Mountain lies along the western boundary of the county and, while it separates it from the Lackawanna Valley, the good road through the gap from Carbondale to Waymart affords access to Scranton markets. A few orchards are located along the foothills and one especially promising orchard is at Waymart but in general the western portion of the county is too rough for profitable farming and a large part is still in forest.

The orchard men in this part of the county haul some fruit to Carbondale and Scranton and sell some to buyers or commission houses, but there is no well-defined shipping market. If the market demand in Scranton is constant the increasing facilities for trucking fruit will no doubt stimulate increased planting in this region but it would be wise to locate orchards where carlots could be shipped by rail during those times when the markets nearby are glutted.

There are some orchards of from two to five acres in the vicinity of Beach Lake, but here fruit is of minor importance and few of the orchards receive needed care. However in spite of this, in favorable years they yield considerable fruit of fair quality. Orchards that receive proper attention and care are very productive.

THE SOUTHERN REGION.

The Southern Region is the most famous in the State although the smallest. It is distinctly a carlot shipping area and the fruit of Franklin and Adams county orchards is found wherever American apples are shipped. In addition to Franklin and Adams this region includes more than half of the counties of Cumberland and York. The growers in the northeastern portion of Cumberland and York sell largely in the Harrisburg and York markets and so are placed in the Southeastern Region, which is typically a local-market region. The Southern Region is largely the northern continuation of the Shenandoah and Piedmont territory of Virginia and the Cumberland fruit district of Maryland.

The northwestern boundary is outlined by North Mountain, which forms the northern and western boundary of the famous Cumberland Valley. South Mountain, which forms the southern and eastern boundary of the Cumberland Valley, divides Adams County from Franklin and Cumberland. The orchards of the region are planted

A COMMERCIAL ORCHARD IN THE SOUTHERN PENNSYLVANIA APPLE REGION largely on the foothills of the mountains and receive the benefit of excellent air and water drainage although in some places the slope is so steep as to make plowing difficult and soil washing becomes serious.

A few orchards are located high up on the mountains at elevations above 1500 feet but the majority are from 600 to 800 feet above sea level and in general the 1000-foot contour can be considered as marking the western and northern limit of the region. This low elevation with their southern location, gives them a climate better adapted to growing the varieties of the Piedmont and the Shenandoah Valley than those of northern Pennsylvania—the Stayman and Jonathan replacing the Spy and Baldwin, the latter becoming a fall apple this far south. The winter temperatures are sufficiently mild to make peach-growing reasonably safe. The greatest danger is that of spring frosts but because of the excellent air drainage, trouble from this cause is of rare occurrence.

Twenty-five years ago commercial orchards were almost unknown in this region but as the apple growers of the East began to recover from the depression which reached its low point with the big crop of 1896, a few pioneers began planting in this region and the period from 1900 to 1905 witnessed a great change in this region. The more favorably located slopes were covered with orchards and land formerly held at low values began to climb until it reached as high a figure as that commanded by the best valley land. The succeeding five years, 1906 to 1910, saw a sligh decrease in planting but it was only a "breathing spell" preceding a consistent planting campaign that did not slow up until the advent of the World War in 1914. Of all the orchards surveyed in this region, nearly one-half at this date were still classed as non-bearing.

The orchards in this region are planned with regard to rail shipments except a few in Cumberland and eastern York where trucks are used. For this reason the average apple acreage per farm is much larger than in other regions of the State and the number of varieties grown is usually small, although larger than in most commercial regions of other States. Here too, we find specialization in fruit-growing carried to such a degree that many of the growers have no cash crop other than apples or perhaps apples and peaches. We find also large areas, especially in Franklin County, owned by commercial orchard companies. With a large area producing only the one crop, marketing problems have been simplified but it is a question whether the cost of production under such conditions has not been increased above the cost, when the growing of other crops utilizes labor and equipment at times when the demand for them is light in the apple orchard. Some growers have tried to overcome this difficulty by planting a wider range of apple varieties and also by the growing of peaches.

Except in part of Adams County, only a few by-products plants are maintained and for this reason cull fruit and drops do not bring a very large return and if sold are usually shipped in bulk. The poor market for second-quality fruit makes efficient spraying more necessary and the number of commercial orchards unsprayed is thus very small. Nearly one-half the orchards that have reached full bearing are in sod, largely because of the danger of the soil washing when it is under cultivation but a considerable number of these sod orchards are cultivated occasionally. Of the young orchards, only about ten per cent are in sod at any time during the first six or seven years. Those under cultivation are nearly all planted to some intercrop, corn, wheat, potatoes and oats mostly being used.

The future of this region presents many interesting problems. Nearly one-half the trees as yet have not come into bearing and even the oldest orchards are only reaching full production. (See Table 16). In twenty years we may expect to see the total production increased at least one-half. The production problems are not serious and there is a fairly abundant supply of labor at rates lower than those in most apple-producing sections. The serious problems are those having to do with the disposition and marketing of the fruit. A more detailed treatment of marketing methods in the region is given in the discussion of the various counties included and in the chapter on marketing. It is sufficient at this point to say that, excepting the larger growers who have developed a standard pack and a regular market, much of the fruit is sold by the grower at a lower price than obtains in the other commercial areas of the State and this is especially true during years of larger crops. Under such conditions one naturally thinks of the benfits possible through cooperative packing houses and central selling associations. Attempts to establish these have been made with only indifferent success in most cases. The larger growers, the ones who usually control public sentiment, maintain their own packing-houses and trained organizations and have developed their marketing methods to such an extent that they prefer to handle their own fruit and many of them buy and pack the fruit of the smaller growers. Eventually some sort of centralized cooperative packing-house arrangement will be adopted by the smaller growers and it is hoped that some day much of the fruit of the region will be sold through two central associations, one in the Cumberland Valley and one covering Adams County and part of York.

TABLE 16. NUMBER OF APPLE TREES: SOUTHERN REGION.

(1920 Census)

Counties entirely in region	Trees Bearing	Trees Non-Bearing	Total	Rank in total number trees
Adams	254,228	280,355	534,583	1
Franklin	239,011	101,424	340,435	3
	493,239	381,779	875,018	
Counties partly in region				
Cumberland	106,791	77,271	184,062	18
York	234,526	141,938	376,464	2
Total entirely or partly in region	834,556	600,988	1,435,544	

Adams County: Although this region is much more of a unit than any other region in the State, each county differs from the others in so many ways that a brief description of each would seem desirable. Adams County lies in the south-central part of this region. Nearly all the fruit in this county is planted on the lower foothills of South Mountain. The few orchards located on the level lands in the vicinity of Gettysburg and further south are practically negligible but from Jack's Mountain to York Springs there is a group of hills where the apple is "king" and the peach is "queen" To be sure many other crops are grown on most of the farms but the important cash crops in this region are apples and peaches. In 1878, Noah Sheely, of Cashtown, planted the first large commercial orchard in the county, consisting of 2000 trees. The first carlot shipment of apples from the county was from this orchard in 1893

There are several conditions which act as handicaps to commercial fruit growing in the county. There is not sufficient cold or common storage space in the county and it is necessary to ship the fruit out as soon as harvested. Only in recent years has there been

THE "FIRST" COMMERCIAL CROP IN THE "FIRST" COMMER any movement to establish by-product plants and the limited capacity is inadequate to handle the full supply. The region has not developed the cooperative packing idea and many of the smaller growers prefer to sell their crop in bulk to growers or buyers who who have packing-house facilities. The Gettysburg and Harrisburg division of the P. & R. Railroad and the Western Maryland furnish fairly good shipping facilities.

Young orchards usually are cropped until the trees come into bearing. In this way a certain income is secured from the land and the trees do not appear to suffer any injury by this system of management. After the trees come into bearing the orchard is cultivated either annually or once every two or three years. The fertility is maintained in many cases by the application of nitrate of soda and acid phosphate or by stable manure or by both manure and commercial fertilizers.

Adams differs from Franklin, Cumberland and York in a number of ways. More general crops are grown along with fruit, more fruit is processed in by-products plants and here we find a larger number of small sized orchards than in Franklin and in Cumberland. Practically no fruit is sold here on the local markets, whereas in parts of York County and eastern Cumberland, this is the commonest method of disposing of the crop. Usually the owner lives on the farm and takes care of the orchard. The combination of livestock and farm crops with fruit tends to create a better balanced farm business, with a corresponding economical distribution of labor.

The Fruit Growers' Association of Adams County, which has been in existence for about 16 years, has been influential in setting a good standard for the county and has encouraged the progressive development of fruit planting. The same good judgment and interest which led the growers to organize this association have made Adams County first in Pennsylvania in production and in number of apple trees.

Cumberland County: The example of her two neighbors, Adams and Franklin, has led Cumberland into apple growing and her commercial plantings are practically a continuation of those of Franklin County, except at the eastern end. Here the proximity of such markets as Harrisburg, Mechanicsburg and Carlisle has stimulated the planting of local-market orchards of only a few acres each. Because of this feature the eastern part of the county is placed in the Southeastern Region where the local market predominates.

On the north slope of South Mountain the orchards extend from the Franklin County line near Shippensburg to the vicinity of Mt. Holly Springs. The Philadelphia and Reading Railroad runs through the heart of this territory. On the northern side of the

TYPICAL ADAMS COUNTY APPLE ORCHARD

county the orchards are scattered along the lower slopes of North Mountain but they are not as numerous here as on South Mountain and only a few extend east beyond Newville. From here fruit goes to market over the Cumberland Valley division of the Pennsylvania Railroad.

The fruit industry is not as thoroughly established in Cumberland as in Adams and Franklin and many of the orchards are not given the good care they deserve and should receive but the climate and soil conditions are excellent and there is every reason to expect that this county will soon rank higher among Pennsylvania fruit counties than its present position of eighteenth.

Franklin County: South Mountain , along the line where it separates Adams from Franklin County, runs nearly north and south, thus the Franklin County side has a western exposure. On this side the lower foothills are dotted with orchards from Shippensburg to the Maryland line. Very little fruit is planted in the main valley. This is true throughout most of the limestone valleys of the State—field crops are grown in the valley bottom and if any fruit is grown it is located on the valley sides. Wherever the air drainage is good, fruit can be grown on the valley soils; nevertheless this land is so highly prized for corn and wheat that even excellent orchard sites are seldom used for fruit.

Across the valley lies another, but less-intensively planted, group of orchards extending from near Mercersburg north into Path Valley and along the foothills from St. Thomas north to the Cumberland line.

Peaches are as successful in Franklin county as in Adams. Many of the young orchards have peach fillers and these orchards are fairly well cultivated for the benefit of the peaches. A smaller amount of manure is used because so many orchards are run as a special business and maintain no cattle that might furnish the manure.

Many of these orchards are of considerable size. It is noticeable that a large number of the orchards are owned by men who are engaged in other business and who spend only a small share of their time in the orchard. The orchard is considered as much a matter of speculation or investment as a part of a well-balanced farm enterprise. The farm land, if there is any, is frequently rented, while the owner reserves the orchard for his own special supervision or hires an orchard manager.

The geographic separation of the fruit areas of North and South Mountain and the fact that so many of the larger orchards are owned by men not living on the farm have prevented Franklin County fruit-growers from developing even as much of a feeling of cooperation as is now found in Adams County.

Canneries and other by-products plants are conspicuous by their absence and this results in a considerable handicap to the county. In the larger orchards the culls and drops are shipped out by the carload but in many orchards the fruit not good enough to go into the barrel is wasted in years of low prices. This is a further incentive to good spraying and in general, the commercial orchards are well kept.

York County: This county is quite different from the others in the Southern Region. The topography is considerably more broken, there is a wider range of soil types and the good fruit soils and locations are scattered throughout the county instead of being located in such well defined belts. To most people it will be a surprise to learn that this county ranks second in the State, in number of apple trees. The orchards are so widely scattered throughout the county that even those who know the county well do not realize the large number of trees within its borders.

The local-market and the wholesale orchard are both found in the county. In the northern part near Harrisburg and in the central part near York, practically all the fruit goes to the local markets but in the southern and western parts there are large orchards from which the fruit is shipped in carlots. Even these orchards occasionally send truck loads of fruit into smaller towns of the county. The orchards generally are owned by men who live on the farm and who make fruit growing a part of their general farm business. To offset the many advantages in growing fruit on the general farm there are some disadvantages. To grow fruit well requires expert knowledge and close and timely attention. On the general farm there is frequently too strong a temptation to neglect spraying and cultivation in order to get the field crops planted. This has been true to a large extent in York County and many promising orchards have not received the care necessary to make them highly profitable.

The future of fruit growing in York County is very promising. Soil and climatic conditions are favorable and the many small villages offer a supply of labor for the picking and packing and a market for some of the second quality. Peaches are grown successfully in the southeastern part of the county and this is usually an aid to apple growing, the peach being used extensively as a filler in the apple orchard. The splendid rail connections also are an added advantage. From a point of both economic and climatic conditions it would seem desirable for other phases of fruit growing to be developed here along with the production of apples and peaches. At present plums, cherries and small fruits are not extensively grown

A SOUTH MOUNTAIN ORCHARD IN FRANKLIN COUNTY.

but there is no reason why they cannot be grown to advantage and many indications point to the grape as a profitable crop in York County.

THE CENTRAL REGION.

The Central Region extends from the Northeastern and Southern Regions to the western tier of counties, excluding Butler, Allegheny and the western half of Armstrong, Westmoreland and Fayette. This region covers a wide range of topography, soil and climate. The backbone of the Allegheny Mountains cuts through the southern half and the Susquehanna and Allegheny Rivers and their branches have so eroded the high plateau which forms the northern half that much of the land is not adapted to agriculture. About one-fourth of the counties in this region are too rough and mountainous for orcharding. None of the others except Bedford is now of the first rank although Tioga and Perry have been of considerable importance. (See Table 17).

The last two decades as indicated by the census returns have seen a steady decrease in the number of bearing trees in this region. This is because the orchards were chiefly the home orchards of from one to five acres set out when the country was first opened up or during the boom following the close of the Civil War. Lack of care and the unchecked ravages of the San Jose scale have taken heavy toll in these orchards and with the exception of Bedford and a few scattered localities in the eastern tier of counties, the new plantings have not been sufficient in numbers to replace those that have gone out.

The varieties grown in this region include practically all those found in northeastern United States, ranging from such hardy sorts as Spy, McIntosh, Wealthy and Oldenburg in the more elevated parts of the northern counties to southern varieties like Smokehouse and Grimes, and in addition there are large numbers of seedlings in the older orchards.

As this range of varieties would indicate, the region is not a unit but these counties are so grouped: because they sell most of their apples in open packages in nearby markets or ship them out in bulk; and because in them the apple crop is of minor importance. As would be expected in such a large territory, localities exist where the apple is grown intensively and with profit and where the most modern marketing methods are followed but these are in direct contrast to the usual methods employed throughout the region.

TYPICAL OF MANY OLD HOME ORCHARDS IN CENTRAL PENNSYLVANIA. THIS ORCHARD SHOWS THE FIRST RESULTS OF RENEWAL PRUNING.

The older orchards are nearly always in sod and few of them receive systematic spraying or fertilization. They still give good yields of mediocre fruit in favorable years but usually are complete failures in off-years. The younger orchards are chiefly in Bedford County and the counties along the eastern edge of the region in the Susquehanna Valley. These orchards are of commercial varieties and of commercial size and when located near such good markets as Williamsport, Sunbury and Altoona are providing profitable investments. Most of Bedford County, where the planting has been heaviest, is handicapped by poor transportation and the success of an otherwise promising fruit section is seriously threatened. With better roads and adequate railroad service this county would rank with Franklin county. As it is, Bedford shipped 148 cars in 1920, only part of which was graded and packed.

There should be a considerable increase in planting in this region. The old home orchards are going out so fast that many farms will soon produce no apples and there are many cities and villages in the region that could be much better supplied by local orchards. The development of motor truck transportation in opening up markets that were previously inaccessable should stimulate new planting and lead to better care of those orchards now planted. It is doubtful if any large commercial areas other than those in Bedford County will be developed here but such counties as Tioga, Lycoming, Union, Snyder and parts of Juniata, Mifflin, Huntingdon, Blair, Centre, Clearfield, Armstrong, Clarion and Venango offer fine chances to use the apple as a main crop on a diversified farm much as is done in most of western New York.

Today the region contains only a few counties where apple growing is of sufficient importance to justify a detailed discussion. During the apple survey, a careful study was made of Bedford County and a number of surveys secured in Blair County. Except for six or seven counties in the northern part, which are of least importance as far as fruit-growing is concerned, all of the other counties of the region were visited by a survey crew and a study made of the most important features pertaining to apple growing. On these trips a large number of growers were visited and answers to many of the most important questions of the survey were secured from them, although no regular survey blanks were filled out. These trips furnished the data for every good birds-eye view of the Central Region.

Bedford County· The most important fruit county of the Central Region is Bedford. For many years this county led the State in number of apple trees but now it has dropped to fourth position although it still leads in number of bearing trees. The fact that Bedford ranks twelfth in the number of young trees tells its own story. The handicap of a mountainous region with insufficient rail transportation and poor roads has proved too much for many of Bedford's fruit-growers and we will probably see this slump in planting continue for some time.

Bedford County is crossed from north to south by steep-sided mountains broken by only a few passes at long intervals through which poor roads run. A branch of the Pennsylvania Railroad runs

A BEDFORD COUNTY APPLE ORCHARD.

north from Bedford, in the center of the county, to Altoona and affords an outlet for the fruit of the northwestern section of the county, although most growers still have long hauls over rough roads to reach the railroad. Another road, the Huntingdon and Broad Top Mountain Railroad, runs east from Bedford to Everett, thence north through a section producing little fruit. A second branch of the Pennsylvania Railroad runs from Bedford northwest to Wolfsburg, thence southwest through Manns Choice and Buffalo Mills, meeting the Baltimore and Ohio Railroad near Hyndman in the southwest corner of the county. There remain several extensive areas south of Bedford where there is no outlet save by hauling long distances over extremely bad dirt roads.

Table 17. NUMBER OF APPLE TREES: CENTRAL REGION. (1920 Census)

Counties entirely in region	Trees Bearing	Trees Non-Bearing	Total	Rank in Total Number Trees
Bedford	279,283	59,893	339,176	4
Blair	114,110	28,528	142,638	30
Cambria	99,536	25,682	125,218	38
Cameron	6,712	2,703	9,415	66
Centre	77,954	22,397	100,351	48
Clarion	88,699	25,627	114,326	41
Clearfield	118,394	18,869	137,263	35
Clinton	37,322	8,100	45,422	59
Elk	26,344	4,502	30,846	63
Forest	15,576	2,639	18,215	65
Fulton	92,080	15,026	107,106	44
Huntingdon	88,687	35,998	124,675	39
Indiana	130,910	34,098	165,008	23
Jefferson	113,934	25,104	139,038	33
Juniata	42,884	12,094	54,978	56
Lycoming	111,289	33,397	144,686	28
McKean	49,101	6,708	55,809	55
Mifflin	30,305	13,344	43,649	60
Perry	68,046	34,612	102,658	46
Potter	83,131	7,163	90,294	49
Snyder	51,742	29,920	81,662	51
Somerset	159,041	39,542	198,583	14
Tioga	122,762	10,161	132,923	37
Union	37,817	10,725	48,542	58
Venango	88,499	13,531	102,030	47
Warren	99,271	3,954	103,225	45
	2,233,429	524,317	2,757,736	
Counties partly in region				
Armstrong	118,664	28,035	146,699	37
Fayette	100,896	20,336	121,232	40
Westmoreland	157,295	51,638	208,933	12
Total entirely or partly in region	2,610,284	624,326	3,234,600	

The orchards of the county ranging from a few acres to from thirty to forty usually are planted on the sides of narrow valleys. The majority are located on DeKalb soils with some few on Upshur, Hagerstown and Frankstown soils. The elevations range from 1000 to 1500 feet. Ben Davis, Gano, York and Stayman are found in nearly every orchard.

As the big planting boom began about twenty years ago, practically all the orchards should now be in their prime but in many parts of the county the impression received is one of neglected trees sadly lacking in vigor. There are some very good orchards in the county and they show the future possibilities of the region but if Bedford is to remain an important fruit county her marketing method must be changed, her roads improved, better rail connections secured and her orchards must receive more consistent fertilization and better spraying. When these things are accomplished Bedford may again become one of our leading apple-producing counties.

Blair County: Bedford County is joined on the north by Blair; while this County is nearly as mountainous as Bedford, it is very much better situated with relation to railroads, roads, and markets. The Pennsylvania Railroad shops are located at Altoona and in normal times this city furnishes a good market for much of the second quality fruit of the region. A number of large orchards in this county ship their fruit in carlots to Philadelphia, Pittsburgh and other distant markets but many of the orchards are of smaller size and the fruit from these is sold on local markets.

The main line of the Pennsylvania Railroad which runs through the center of the county supplies excellent rail connections and the success of some of the present orchards fortunately is leading to an increased interest in fruit growing. If orchards are so located as to secure the full benefit of air and water drainage and have but a short haul to the railroad, there is no reason why they should not be as successful as any of the commercial orchards of the Southern Region.

Huntingdon County: East of Blair County and similar to it in its agriculture lies Huntingdon County. The good air and water drainage supplied by the Juniata Valley, and excellent rail connections together with the presence of several towns of some size have resulted in the planting of a number of commercial orchards. While peaches have proved of more or less indifferent value, apples are doing well and the county now ranks third in the Central Region in number of young trees.

Somerset County: The next county to Bedford in total number of trees in the Central Region is Somerset with a rank of fourteenth. Somerset is also second in the region in number of young trees.

This county is considerable like Bedford in topography and in its apple industry but nearness to the city of Johnstown and somewhat better rail connection are helping it to maintain its position as a fruit county and may even advance its rank somewhat.

There are a few other counties in the Central Region in which are located orchards that supply carlot shipments. Centre, Lycoming, Perry, Potter, Snyder and Tioga in the last five years have done more or less shipping. Of these Lycoming and Tioga are the most important. Twenty years ago Lycoming ranked next to Franklin and Tioga was above Lancaster in number of bearing apple trees. Since that time there has been but little planting in Tioga and the old orchards have been going out rapidly, whereas in Lycoming a number of paying orchards have been planted since 1900. These two counties remind one forcibly of the territory covered by Luzerne, Wyoming and Susquehanna. The region is a high plateau cut up by numerous small streams and the west branch of the Susquehanna supplies much the same situation in Lycoming as does the east branch through Luzerne. The orchards, when they are planted for commercial purposes, are located on valley-sides but as most of the orchards are of the farm type, these are found sheltering the houses and barns. The newer commercial orchards barrel the fruit and ship it in carlots but most of the fruit in the county is consumed on the farms or made into cider and apple butter.

Between the parallel ranges of the Alleghenies which run northeast through the central part of the State lie many narrow, limestone valleys where the rich land has built up a very prosperous type of agriculture. The old farm orchards of these regions are rapidly disappearing but here and there on the valley sides or on the hilltops that rise above the valley bottoms in Centre, Union, Mifflin, Snyder, Juniata and Perry Counties one finds excellent young orchards. Most of these are planned for rail shipments but many growers are finding the valley farms that no longer have their own home fruit the best market.

There are many excellent sites throughout these central counties and the love of fruit growing will always lead progressive men to utilize some of them. While they never will rank high as fruit counties, fruit will always be one of the important crops of the region.

Cambria, Clearfield and Indiana counties are developing local-market orchards to supply the small towns and cities in that section of this region. The commonest orchard is, of course, the old farm orchard but Indiana is only a little behind Huntingdon in number of young trees and we may expect commercial orchards of the local-market type to maintain these counties at about their present rank.

A PROMISING APPLE ORCHARD IN CENTRE COUNTY.

THE WESTERN REGION.

The Western Region covers the western tier of counties as well as Butler, Allegheny and the western parts of Armstrong, Westmoreland and Fayette counties. This can be divided into three divisions: (1) The territory supplying Pittsburgh and the manufacturing cities of the Monongahela, the Allegheny and the Beaver valleys; (2) the territory covered by most of Mercer, all of Crawford and southern Erie where the dairy cow has displaced the apple tree; and (3) the northern portion of Erie. The first of these districts is a high plateau which has been cut into rolling hills and deep valleys by the many streams. This gives a topography well-adapted to fruit-growing and the splendid markets close at hand make this a very desirable fruit-growing section. In 1890 and 1900, Allegheny County was first in the State in the number of bearing apple trees.

Pittsburgh was the gateway through which many of the first settlers reached the Ohio Valley and much of the Mississippi Valley and the apple seeds and seedling trees, which went down the Ohio on many of the crudely built flat-boats that the settlers used, came largely from the seedling orchards which were early planted in this part of the Western Region. The promising results with these early orchards led to a considerable planting of fruit in the vicinity of Pittsburgh. It was probably the ravages of the San Jose scale that prevented this region feeling, to any great extent, the boom which swept the Southern and Southeastern Regions after 1900 and few fruit-growing counties in the rest of the State show as little replanting for the last twenty years as do the counties near Pittsburgh in spite of the fact that Pittsburgh has been one of the best markets in Pennsylvania.

Table 18. NUMBER OF APPLE TREES: WESTERN REGION.

(1920 Census)

Counties entirely in region	Bearing Trees	Trees Non-Bearing	Total	Rank in Total number trees
Allegheny	151,246	57,079	208,325	13
Beaver	102,095	54,679	156,774	26
Butler	165,238	44,015	209,253	11
Crawford	198,025	19,434	217,459	9
Erie	171,757	46,679	218,436	8
Greene	134,288	27,552	161,840	25
Lawrence	74,743	32,590	107,333	42
Mercer	141,841	29,714	171,555	21
Washington	129,212	46,970	176,182	20
	1,268.445	358,712	1,627,157	
Counties partly in region				
Armstrong	118,664	28,035	146,699	27
Fayette	100,896	20,336	121,232	40
Westmoreland	157,295	51,638	208,933	12
Total entirely or partly in region	1,645,300	458,721	2,104,021	

Allegheny, Butler and Westmoreland Counties: Of the counties in the Pittsburgh district, Allegheny falls slightly behind Butler and Westmoreland in the total number of apple trees but leads both of them in the number of non-bearing trees. (Table 18). These three counties, with parts of Washington, Fayette and Armstrong, have too many similarities to describe them separately at this time. The tremendous concentration of population in the river valleys has created a market which absorbs far more fruit than could be grown in these counties. It is rather surprising that there has not been a greater development of local-market orchards to meet this demand.

The fruit of these counties is usually found on the gentle hills which are so characteristic of the plateau areas back of the rivers. The orchards are seldom over eight or ten acres and frequently are planned as part of a general cropping system to supply some particular, nearby market. The soil, which is nearly all mapped as belonging to the Westmoreland series, seems well-adapted both to apples and peaches. It is not uncommon to find peach orchards which have stood fifteen or twenty years in sod and which are still in a fairly thrifty condition. San Jose scale, which swept this territory so disastrously about fifteen years ago, is again on the increase and the red spider is also becoming troublesome but both of these pests are readily controlled and should not discourage increased planting.

The hills on both sides of the Monongahela south of Pittsburgh offer excellent sites for orchards with their splendid air-drainage and nearness to fine markets, yet strange to say not many orchards are found. The interest in mining, oil and gas has injured agriculture in this region as it has in all other mining regions. The orchards here are mainly the older ones put out 30 or 50 years ago, with a few planted about fifteen years ago and others from five to ten years old. In this region peaches are more important than apples.

Farther to the west, orcharding improves noticeably. Many of the trees from 40 to 60 years old are still in fair condition, the vacancies caused by death of old trees have been filled and younger apple plantings have been established. Here apples and peaches are about equally important. Most of the orchards are in sod but at intervals one is found that receives some cultivation and commercial fertilizers or manures are used extensively. The land is rolling but in most cases the slopes are not too steep for orcharding, especially where the orchards are in sod. Trees grow well in the Westmoreland loam, although on some of the hills washing has brought the shale very close to the surface.

Good roads to Pittsburgh and to the smaller, neighboring towns, facilitate marketing and much of the fruit is sold direct to consumers or to grocers and restaurants. Selling at the farm to auto parties is just beginning to be an important method of marketing.

Conditions are much the same in the rolling lands north of the Allegheny. There is no one center and the orchards are considerably scattered but this is not the handicap that it would be if the fruit was sold wholesale as in western New York.

The best fruit region of Butler County is southwest of Butler city. Outside of this region the orchards are usually small and poorly cared-for but this part of the county has so much better marketing conditions that a number of fifteen or twenty-acre orchards have been planted and there is one orchard of over 200 acres. The same condition which should lead to increased planting in Allegheny and western Westmoreland should also help this part of Butler County.

Beaver County: There is little left of the old plateau level in Beaver County. Nearly the entire area is cut up by the small streams and the numerous side-valleys, giving the country the appearance of a jumbled collection of round-topped hills. The tops and sides of these hills furnish excellent orchard sites with splendid air-drainage to the Ohio.

PLOWING UNDER SUCH A COVER-CROP ADDS THE HUMUS NEEDED TO BRING UP THE FERTILITY OF THE ORCHARD.

In general, the apple orchards are the older farm orchards of not more than a couple of acres but there are several noticeable exceptions where considerable areas have been set within the last ten years and where the trees are receiving fairly good care. Nearly all the orchards are in sod and in many the hay is cut and removed. Because of this practice, the great need of the orchards is more fertility. The soils are the result of the weathering of shales and sandstones with some limestones, and vary from a shale loam to a sandy loam, with a few areas that are quite sandy. One of these, that in the vicinity of Green Garden, has become an important peach center. In most of the younger plantings of apples throughout the vicinity, peaches have been used as fillers.

This county would seem to be well suited to peaches. "Yellows," although occasionally seen, has never been a serious obstacle to peach growing. Curculio is not in sufficient abundance to cause trouble even in orchards that receive only the scale spray. The most prominent feature of the peach industry is the fact that practically all the orchards are in sod.

Probably the most intensively planted area in the county lies west of the city of Beaver along the tops of the hills that slope to the Ohio. Here are some old home orchards from 50 to 60 years old but the chief plantings have been made in the last fifteen years. Here also are several farmers with blocks of more than 50 acres of fruit and the region generally promises to become an important apple and peach center.

In a number of cases, spring frosts for the last three or four years have caused considerable damage. Until more is known of fruit conditions in the Beaver Valley, it would be wise to plant only those areas that have the best air drainage. The winter of 1917-18 caused some damage and Baldwins are found occasionally with crotch injury, but all told the damage was not serious, even with the peaches.

Lawrence County: Although this county and a portion of Mercer county near New Wilmington and Sharon, are included in the Pittsburgh district, practically all the fruit is marketed in the Beaver Valley towns. The contrast between the old, neglected home orchards and the modern, well managed commercial orchards is very sharp. The old orchards are going out fast but nearly one-third of Lawrence County's total number of apple trees are still too young to bear.

Nearly all of Lawrence County has been glaciated and in some parts the soil is a rather heavy clay with poor drainage. In such locations considerable winter injury is in evidence and such sites should be avoided for commercial plantings. The varieties grown through the Pittsburgh district are a mixture of northern and southern sorts; both Baldwin and Stayman do well and Spy, Grimes, McIntosh and Jonathan are also popular varieties.

Crawford County: This county now ranks fifth in the number of bearing trees in the State whereas ten years ago it ranked third, yet one may drive through the county from end to end and not see a half dozen profitable, commercial orchards. It is the small farm orchards of not more than two or three acres that combined give Crawford County its present rank. The total production for 1919 was only sufficient to place the county thirty-fourth as compared with the production of the other counties in the State and it has the smallest number of young trees in the entire Western Region. The old orchards receive very little care and it will be but a short time before the last of these is gone. The same is true of northern Mercer and of parts of southern Erie.

Erie County: The most remarkable change in topography, climate and agriculture in the State of Pennsylvania is the change one sees in driving from some of the hill orchards of central Erie County down to the old lake bed which forms the far-famed grape-belt of this county and of Chautauqua County in New York State. On the upper plateau, the orchards are nearly all old and of small acreage but nearness to better markets has led to their receiving more care and they are in much better condition than are the orchards in Crawford County. On the lower level we find scattered small, old orchards, most of which are receiving excellent care and which are good for many years of productive life, but one who has heard of this belt only as a grape region is much surprised to see the splendid young orchards which dot the view from the first rise of the foothills.

The grape growers of Erie County have begun to realize the value of crop diversification and a number of very fine commercial apple orchards have been planted in conjunction with some of the larger vineyards. In a number of sections in the grape-belt the soil is too heavy for grapes to do well but apples and plums can be grown with profit. Erie now ranks eighth in total number of apple trees and these young orchards promise to compensate for the loss of the old orchards.

THE APPLE AND THE GRAPE ARE PROFITABLE COMPANIONS IN ERIE COUNTY.

THE APPLE SURVEY.

NUMBER OF SURVEYS MADE AND ACRES COVERED.

While only 736 survey sheets were completed, fully as many more farms were visited and much valuable information gathered that does not appear in the tables. This was especially true in the outlying counties where it was very difficult to get all the information necessary to fill out the complete survey blank. The Federal Census reports a little over nine million apple trees in the State which probably cover about 250,000 acres. In this investigation a total of nearly 25,000 acres was surveyed or about one-tenth of the acreage in the State. (Table 19). The area most thoroughly covered was Adams County, where more than half of the acreage was surveyed. No important territory was left until the members of the survey crews had visited a wide enough range of orchards sufficient in number to furnish a fairly accurate record of average conditions in a given territory.

Table 19. NUMBER OF SURVEYS PER COUNTY WITH ACRES OF APPLES BEARING AND NON-BEARING.

Counties	Number Surveys	Total Bearing Acreage	Total Non-Bearing Acreage	Total
Adams	165	3286	4037.5	7323.5
Armstrong	7	47	15	62.
Allegheny	11	96.5	28.5	125.
Beaver	14	71.5	23.5	95.
Bedford	44	676.5	328.	1004.5
Berks	7	85.5	158.5	244.
Bucks	9	80	79.	159.
Butler	10	297	7.	304.
Blair	14	184	446.	630.
Columbia	11	47	6.	53.
Chester	19	264.7	235.	499.7
Crawford	3	106	14.	120.
Cumberland	40	1178.5	1413.	2591.5
Delaware	9	41	124.	165.
Erie	15	307.5	76.5	384.
Franklin	93	2794.5	1392.5	4186.
Lawrence	22	189	118.	307.
Lancaster	9	103.7	200.2	304.
Lebanon	11	54.5	207.2	261.7
Lackawanna	26	267.5	80.	347.5
Lehigh	1	100	150.	250.
Luzerne	84	1107	353.	1460.
Montgomery	19	374.5	450.5	825.
Westmoreland	8	32	00	32.
Wyoming	20	249.5	409.5	659.
Wayne	1	40	20.	60.
York	64	1215.5	728.	1943.5
Total	736	13,297.5	11,100.5	24,397.5

AGE OF OWNERS AND SCHOOL ATTENDANCE.

An apple orchard frequently represents an investment of from $300 to $600 an acre. In the business world one does not expect to own a factory with an inventory value of $20,000 to $30,000 without spending years in securing the necessary experience and the capital to make it a success. Orcharding is a business. About one-third of the owners from whom records were secured spent an average of from seven to eight years as hired men, tenants or share-renters before buying farms; so when the ages of the growers were grouped into ten-year periods, the largest group was between the ages of 40 and 50 years, and the next largest between 50 and 60 years. In fact, there were as many fruit-farm owners above 60 years of age as there were between the ages of 30 and 40.

Of the cases where records of the school attendance of the owners were secured, more than one-third received better than a common school education and more than one-half of these received some college training. When we consider separately the ages of those having some college training, the largest group was between the ages of 30 and 40 and a total of more than 15 per cent was under 30. It is doubtful if the college training alone was responsible for these men becoming orchard owners earlier than the average; those who went to college usually had better financial support and this is of considerable importance in limiting the age at which men purchase farms. In spite of the fact that so many worked years to get a start as fruit growers, a surprisingly large percentage started with no previous training or nothing more than that received as a boy on the home farm. It is not uncommon to find that some of the best fruit growers were trained as doctors, engineers, teachers or business men.

PLACE OF BIRTH OF FARM OWNERS.

Only seven of the owners from whom records were secured on this point were born outside of the United States and only 26 other were born outside of the State of Pennsylvania. This is indicative of the conservative nature of Pennsylvania agriculture. It is a business handed down from father to son, and this is especially true of apple growing where the one who plants the orchard seldom reaps its full return.

OTHER KINDS OF FRUIT FOUND ON FARMS SURVEYED.

Excepting Erie County, the peach was the only other fruit found in conjunction with apple orchards in sufficient acreage to be of commercial importance and the chief use of this fruit is as a filler in the young apple orchards. In this way peaches are used to a considerable extent in the Southern and Southeastern Regions. The unusual number of severe winters during the last 10 years has nearly driven the peach out of several counties in northeastern and central Pennsylvania, where formerly it was grown in large numbers and the prevalence of peach yellows in the Southeastern Region has kept down planting in a district otherwise well adapted to peaches. The counties in the Pittsburgh region present some interesting peach problems. Here is found quite an acreage of peaches, some of which are more than 20 years old. Frequently they receive little care and some have stood in sod for years yet they continue to give fair crops. Yellows does not seem to be as severe as in other parts of the State. Frost injury is serious during some years but usually not more so with the peach than with the apple. In spite of what would appear to be excellent, natural advantages and a splendid market, the present acreage is not large. The Erie County plantings seem also to have dropped off rather heavily.

Pears at one time were of considerable importance in Pennsylvania, the State ranking fifth in number of trees ten years ago but only about 600 acres were found on the survey, most of which were old trees.

Only two plantings of plums of more than five acres were found outside of Erie County. In this county some excellent orchards of plums and prunes are found, especially the York State prune. There is a splendid chance to substitute the plum for the peach in regions where the costly experience of the last few years has shown the uncertainty of the latter fruit. Many of our better plums are splendidly adapted to local-market use and the best sorts should receive careful test in the Northeastern and Central Regions.

The grape is not found commercially in the State outside of the narrow belt bordering Lake Erie. Here it is the chief fruit and upon it the economic well-being of two townships is largely dependent. It would seem that the State is neglecting an unusual opportunity in failing to grow grapes in other regions. There is no other fruit more universally liked for table use than the grape and it can be grown in all the fruit-producing regions of the State. Our local-market growers should find the vineyard a very profitable addition to their diversified fruit plantations.

Strawberries and bush fruits are even more neglected than is the grape, when we consider the extent to which they are profitably grown in nearby States. Part of this is due to the absence of canneries. An opportunity is afforded to increase the acreage in the vicinity of our good local markets where pickers can be secured and where there is a good demand.

RELATION OF ACRES IN ORCHARD TO SIZE OF FARM AND TYPE OF BUSINESS.

When a fruit grower sells his crop on a local market along with a considerable amount of vegetables and other farm products, five or ten acres of apples are frequently all he cares to handle, but when the crop is to go to distant markets in carlot shipments, the growers handle much larger areas. The size of the entire farm in proportion to the acres of orchard is also an index showing the extent to which other crops are grown.

In both Adams and Franklin counties the average farm surveyed had about 45 acres of apples but the Adams County farms include about 135 acres of land while the Franklin County farms averaged but little over 110 acres. This supports the idea before-mentioned that Adams County farms grow more farm crops with the orchard than is the case in Franklin. The Cumberland county growers had the largest farms, averaging 154 acres and they averaged nearly 65 acres of orchard to the farm. The presence of better local markets and the growing of more field crops cut the average York County orchard down to about 30 acres and also decreased the average fruit farm to less than 100 acres. (Table 20).

In Luzerne County, the heart of one of the most intensive local-market regions, the average fruit farm was 90 acres and had only about 17 acres of apples. In Blair, Berks, Lancaster and Montgomery the acreage of apples per farm visited was above the 30-acre average of York County though these counties are local-market orchards. This high average is misleading and is due to two causes: (1) The younger commercial plantings are of considerable size although of the local-market type and (2) more of these were visited than of the small home orchards. Had as large a proportion of all orchards been visited in these counties as in Adams and Franklin these averages undoubtedly would have been very much lower.

TABLE 20. CROPS OTHER THAN FRUIT GROWN ON FARMS SURVEYED.

County	Average acres in Farms	Average acres in chief crops							Hogs per 100 Acres Orchard
		Apples	Corn	Wheat	Oats	Potatoes	Hay	Pasture	
Adams	135	43.7	17.3	17.6	5	1.5	17.3	10.4	22
Armstrong	106	9	4.3	8	9.6	1.6	15	16	54
Allegheny	76	11	8.3	6.3	6	.6	17	14	3
Beaver	94	6.7	7.5	7.2	7.6	1	22	16.8	89
Bedford	182	22.8	11.8	11.5	7.3	1	17.6	36.6	47
Berks	138	35	19	8.4	9.6	4	16	11	34
Bucks	68	18	8	3.7	1.7	3.2	12	7	37
Butler	96	30	18	12	19	3.3	32	12	50
Blair	154	45	9.5	8	8	1.2	20	5.5	25
Columbia	80	5.7	11	11	6	1.6	14	4.4	92
Chester	131	26.2	16.6	9.5	5.5	1.8	20.6	14.6	5
Cumberland	154	64.8	15	13	5	1.5	16	5.2	12
Delaware	77	15.5	10	9	7.5	1	14	5	20
Erie	104	25	2.6	2.5	3.4	.7	5	3.5	9
Franklin	112	44	14.9	19.2	1.3	1.4	14.5	5	19
Lawrence	108	14	6.	6.5	6	2.	20.7	24.	34
Lancaster	69	34	9.4	5.3	1.3	1	7	1	8
Lebanon	91	23.5	14	13.6	5.3	3.5	13	9.5	21
Lackawanna	131	13.3	10	1.5	12.6	7.7	13.6	30.7	31
Luzerne	90	16.2	5	2.9	7.5	3.3	19.7	13.6	26
Montgomery	73	37	6.7	3.7	2.5	1.3	10	12	36
Westmoreland	61	4	6	6.2	7.4	1	16	8	4
Wyoming	148	33	6.5	....	6.6	2.7	23.7	23	8
York	99.5	31.3	15	12	3.8	1.2	12	7.6	29

CROP ROTATIONS ON FRUIT FARMS.

In the southern part of the State where the season is long enough to seed wheat after corn, the usual rotation on the farms surveyed was corn, wheat and hay for the main crops. Where there was not sufficient rough land in permanent pasture, part of the meadow was left for pasture. Smaller areas were in oats and potatoes. In the central and northeastern parts of the State where the season is shorter, oats frequently are used to replace part of the wheat and the potato acreage is increased until in some counties it equals the wheat acreage but is always much below the corn acreage. (Table 20).

There are but few points in which the rotation practice followed on fruit farms differs from that on other farms nearby. One of these is the smaller planting of potatoes on farms where there are apples to be harvested. When there is danger of freezing, both these crops must be harvested at the same time and this doubling up of work complicates the labor problem.

Young orchards are almost universally cropped where the land is not too steep. While the crops used are those of the regular farm rotation, for the first years of the orchard corn is most commonly grown. Where wheat and oats are used, the more careful growers leave a cultivated strip in the tree-row or hand-work a circle around the trees.

PERCENTAGE OF TOTAL INCOME DERIVED FROM FRUIT ON FARMS SURVEYED.

As only those farms which had a sufficiently large acreage of fruit to make a survey worth while were visited, the percentage of the total income received from fruit is, of course, high. Some of the variations, however, are interesting. Adams County farms, averaging nearly half their acreage in orchards, get 58 percent of their total income from fruit. This seems low until we remember that more than half the acres surveyed were too young to bear and most of these orchards are still in field crops. The fruit which occupied less than a fourth of the acres cropped actually yielded more than half the income.

One of the most noticeable differences between the fruit regions of Franklin and Cumberland counties compared with Adams is the large number of farms in the former which have almost no source of income outside of apples. This shows in the higher percentage of the total income received from fruit in these counties. Franklin County fruit farms, with about the same acreage in apples as in tilled crops receives 72% of their total income from fruit and Cumberland farms nearly 65 per cent. The very high percentage in Erie, ninety-seven % is because the orchards studied were largely in the grape-belt and on such farms nearly the total cash income is from fruit. (Table 21).

Table 21. PERCENTAGE OF TOTAL FARM INCOME RECEIVED FROM FRUIT ON FARMS SURVEYED.

Northeastern Region	Average Percentage	Southern Region	Average Percentage
Columbia	28.	Adams	58.
Lackawanna	34.	Cumberland	66.
Luzerne	45.	Franklin	72.
		York	63.
Southeastern Region		**Central Region**	
		Bedford	52.
Berks	53	Blair	58.
Bucks	46.		
Chester	47.		
Delaware	61.	**Western Region**	
Lancaster	51.		
Lebanon	49.	Allegheny	57.
Montgomery	64.	Armstrong	50.
		Beaver	34.
		Butler	64.
		Erie	97.
		Lawrence	38.
		Westmoreland	29.

WORK ANIMALS PER FARM WITH AND WITHOUT TRACTORS.

While the survey was not planned as a farm-management survey, a few points only indirectly related to the orchard were studied in the hope that they might throw light on some of our orchard-management problems. It was for this purpose that the questions relative to work animals and tractors were included in the survey. There was little difference in the size of the farms that did and that did not use tractors when we consider only farms of more than 50 acres. Nearly half the tractors were found in the Southern Region and it is significant that the counties here had the largest acreage of apples per farm surveyed. The tractor shows only a slight tendency to replace the farm horse. A few cases were found of farms of over 100 acres operated without owning any work animals but in general the farms using tractors had only one less horse for the same number of acres than farms without tractors. While some farms have sold a team when the tractor was purchased, others have simply added the tractor to the usual equipment. (Table 22).

The number of horses used on farms of the same size differs considerably in different counties and is a fair index of the intensity of the farm work in the different regions. In Bedford County, the farms surveyed of 200 acres or more used about three horses, while in Butler, Luzerne and Wyoming, four horses were used on farms of this size. In Beaver and Lawrence counties, in the western part of the State and Montgomery and Lackawanna, in the eastern, the number of work animals went to five on farms of this size while in Erie and Chester six horses were used. The counties using the fewer horses are those with the roughest contour and those most likely to have their orchards in sod. Why fruit farms in Montgomery should have nearly 50 acres of land more for the same number of horses than her neighbor, Chester, is not apparent since there is more rough land in the latter county.

Table 22. NUMBER OF DIFFERENT MAKES OF TRACTORS FOUND ON FARMS SURVEYED.

Avery	8	Lacross	2
Bates	2	Mogul	6
Beeman	1	Moline	6
Case	9	Nelson	2
Cleveland	53	Peoria	1
Flinchbaugh	1	Pulford	1
Fordson	57	Samson	1
Fraybold	1	Titan	5
Frick	1	Universal	1
Happy Farmer	1	Waterloo	1
Huber	3	York	3
International	45		
Using hired tractors			7
Total number of tractors			218

DAIRY AND BEEF CATTLE AND HOGS ON THE FRUIT FARM.

The cow and the apple tree are not good companions on the same farm. To be successful in fruit growing it is not sufficient that your farm be well-adapted to fruit, the grower must put something of himself into his work—he must like to grow fruit. This is one of the chief causes leading to the development of our intensive orchard plantings; men who have liked to grow fruit have planted trees to the exclusion of other crops. Much the same thing is true in dairying. Few men have made a success at producing both apples and milk because few have combined a liking for both. Twenty years ago Crawford County ranked second in the State in the number of bearing apple trees. Today only two counties in the State have a smaller proportion of young trees as compared with bearing trees but today Crawford ranks among our leading dairy counties. Good apples can still be grown in Crawford County but there was not sufficient interest to tide the growers over the discouragements of San Jose scale and a few years of low prices. One dairyman, when asked why he grew apples, said "to give the cows some shade." Cattle are found on orchard farms chiefly where there are considerable areas of rough land. Most apple growers find sufficient to do in the orchards to keep the men hired by the year busy in the winter and furthermore, the best orchard land is seldom the best corn land so there is but little incentive to winter feeding.

The fruit growers of Adams, Cumberland, Franklin and York are practically the only ones who raise beef cattle to any extent. The presence of large areas of rough land and the possibility of growing good corn on the more level adjoining land resulted in nearly 50 growers in this region maintaining herds of over 10 cattle, most of them for beef. The rough land in Lackawanna County also has encouraged cattle raising but here dairy cows were raised to supply the many cities of the county.

Raising hogs seems to fit into the management of the fruit farm somewhat better than do cattle. Possibly this is because hogs can be pastured in the orchard more successfully than cattle. The fruit farms in 12 of the counties studied averaged 25 or more hogs to each hundred acres of orchard. (See Table 20).

NUMBER OF ACRES FOR EACH HIRED MAN.

In years of big crops when competition begins to force down the farm product prices, our ability to make or lose money frequently depends upon the efficiency with which we manage our labor. The number of surveys noted where the farm was run without a hired man was too small to be of any great significance. In these cases either occasional labor was hired by the day or other members of the family, usually the wife or daughters, assisted in the work. The largest group of farms had one hired man. These farms averaged 96 acres of land or 48 acres per unit of regular labor including the owner as one of the laborers. This was figured on the basis of total acres per farm as it was not possible to base it on acres of crops from the data given on the surveys. Crop acres per man would have been considerably smaller but the comparison of total acres in the different groups is reliable. Except for the harvesting and occasionally for some of the spraying, apple growing makes about the same, or even less, demand on regular labor as does the growing of general crops. The amount of extra help hired for harvesting will be discussed later.

How many regular hired men do fruit farms of the various sizes use? Farms where two men were hired for the year or for the full season averaged 132 acres of land or 44 acres for each worker, including the owner as one of the laborers and those where three were hired averaged 177 acres which is also 44 acres per unit. When four men were hired, 186 acres were handled or only 37 acres per labor unit. The numbers in the groups where five or more men were employed were too small to make the averages reliable but they seem to indicate a somewhat smaller acreage handled per unit of labor on the larger farms. (Table 24).

A study of the extra labor hired at harvest time shows the same decrease in the acres handled per man as the size of the crew increases. Farms where usually only one extra helper was hired for the picking season averaged 19 acres in orchards. The group containing the largest number of farms was that where two extra helpers were hired and on these farms there was an average of 22 acres of fruit, or 11 acres per extra laborer. Where three were hired the farms had nearly 34 acres in orchards, or about 11 acres per extra man. The number of acres of orchard per extra helper when four were hired dropped to slightly below seven and the farms averaged only 27½ acres. The next group with five extra laborers had nearly the same number of acres per man and an average per farm of 33 acres of fruit. The averages for those farms where 6 extra laborers were employed are larger than the normal because of the presence in the group of two farms with an average of over 300 acres of orchards. These were probably orchards just coming into bearing, since orchards of this size would need from 20 to 30 harvest hands if in full crop. When seven or more helpers were employed the acres of orchard per man usually ran below six but the groups of these large orchards are too small to make the averages very accurate. (See Table 25).

Does the efficiency of labor decrease as the size of the crew increases? Apparently it does but there is another factor which offsets this somewhat. The cost of supervising labor does not increase proportionately with the size of the crew, since one foreman can handle 15 men nearly as well as 10. On farms where a manager is employed in addition to the foreman or when the owner is manager and draws a manager's salary, this charge is one of the heaviest, hence the more acres over which it can be distributed, the smaller the charge against each barrel of fruit produced.

On 142 of the farms surveyed, the wife helped with some of the farm labor and on 67 of the farms, the daughters also helped. Labor conditions on the farms in 1920 still showed the effects of the war shortage and this was probably responsible, at least in part, for some of these cases. Nevertheless, on many fruit farms it is the custom for the women of the family to help with fruit picking and packing.

TABLE 23. NUMBER OF HIRED MEN IN RELATION TO SIZE OF FARM.

Number of hired men	Number of farms in group	Average acres per group	Average acres per hired man	Average per labor unit
1	179	96.09	96.09	48
2	163	132.24	66.12	44
3	65	177.00	59.00	44
4	26	186.00	46.50	37
5	7	332.14	66.45	55
6	2	110.00	16.33	31
7	6	366.66	52.38	46
8	4	337.50	42.19	37
9	—	—	—	—
10	3	333.33	33.33	30
11	1	350.00	31.81	*
12	1	600.00	50.00	*
13	1	350.00	26.92	*
15	1	700.00	46.66	*
18	—	—	—	—
20	2	700.00	35.00	*
27	1	500.00	18.51	*

*Number in group too few to make average of any significance.

TABLE 24. NUMBER OF EXTRA HELPERS IN RELATION TO ACRES OF ORCHARD ON FARM.

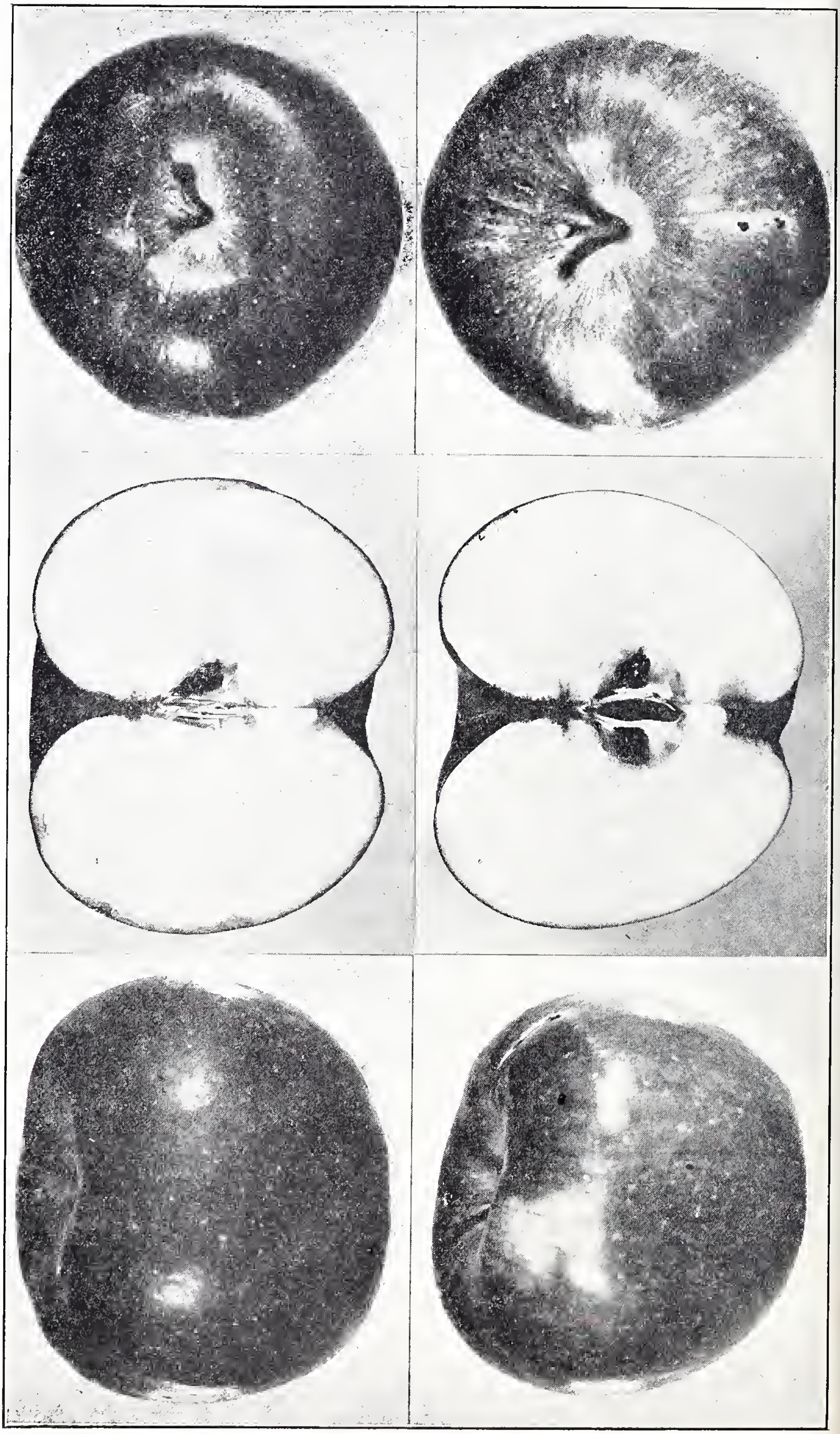
Number additional helpers	Number of farms in group	Average acres orchard for group	Average acres per man
1	36	19.2	19.2
2	76	22.29	11.145
3	29	33.7	11.23
4	24	27.58	6.89
5	22	33.4	6.68
6	32	60.56	10.09
7	10	40.6	5.8
8	10	34.00	4.25
9	2	15.00	*
10	17	44.60	4.46
11	2	25.00	*
12	8	36.25	3.02
13	1	50.00	*
14	2	82.50	*
15	9	70.50	4.7
16	4	75.00	*
17	1	50.00	*
18	9	48.88	2.71
20	10	90.50	4.50
25	8	196.90	7.80

*Number in group too small to make average of any significance.

APPLE VARIETIES.

One of the questions that always arouses keen interest at any fruit-growers' gathering is "What is the best variety for this region?" The best answer to that is usually found in the region itself, not in the variety most generally planted but in the varieties that the experience of different growers has proved the best and the varieties they plan to plant when they extend their acreage. In Table 25 is given the growers' choice of the most desirable apples now growing in the different regions. A variety which suits the purposes of one man may not be desired by his neighbor who may be selling in another market and handling his trees in a different way. This has resulted in many varieties receiving a vote for "first choice." When any considerable number of men in one region think the same variety is the most profitable one, we may be reasonably

Plate XV Baldwin and Spy



sure that that particular variety is worth growing in that region. The final criterion, however, is whether a grower thinks enough of a variety to plant it again, when he extends his acreage. In Table 26 is shown the list of varieties which growers plan to plant.

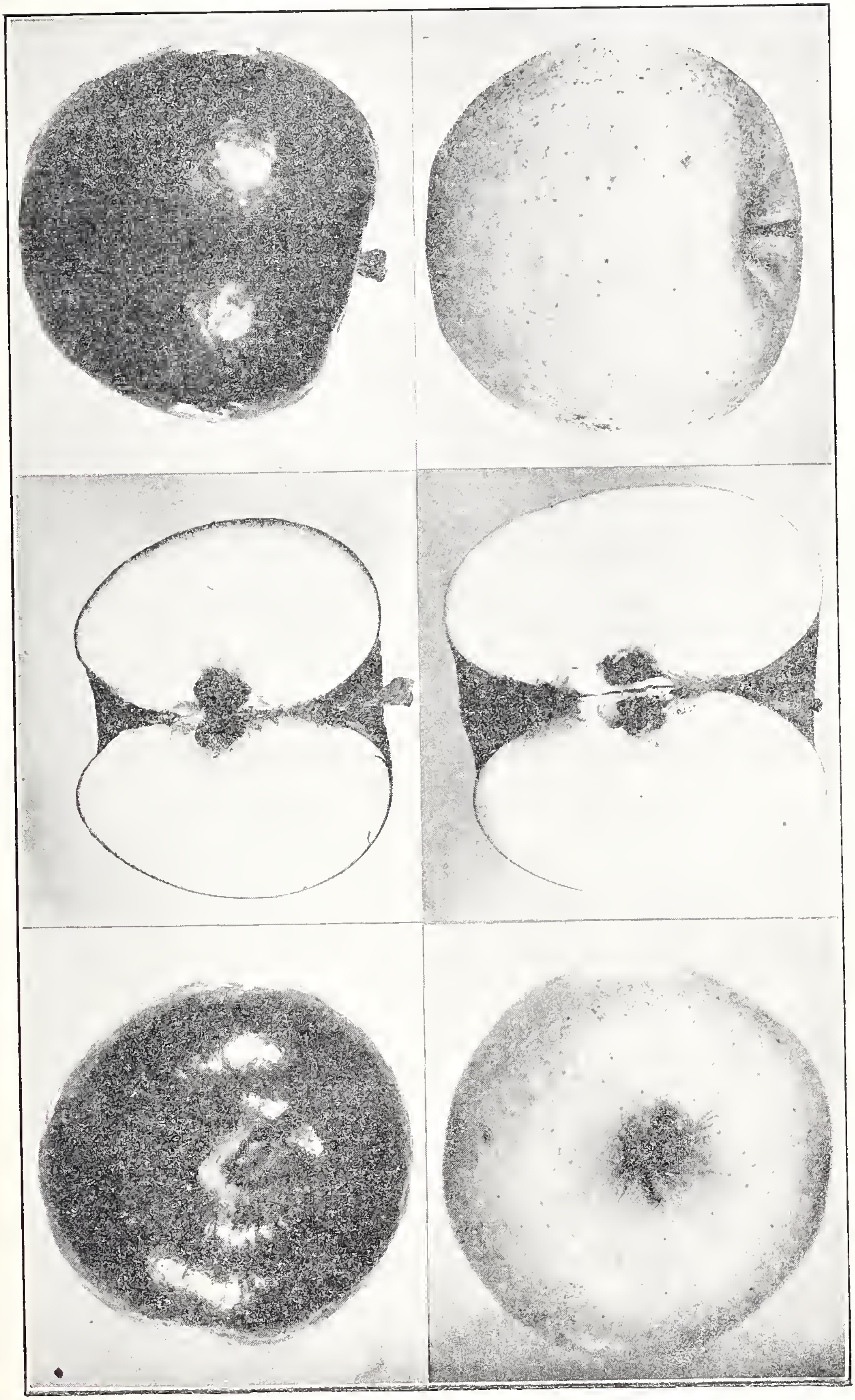
York was considered the most profitable variety in their orchards by 181 growers while only 129 placed Stayman as most profitable (Plate XVII); but evidently many of these same men who favored the York thought there was a limit to the amount of this variety that could be grown with profit as only 57 were planning to plant York while 110 were expecting to plant Stayman. Orchards in the Southern and Southeastern Regions put out in the last few years show this same tendency to favor Stayman and it will not be many years before Stayman will surpass York in number of trees in the State. Thus, in Adams, Franklin and Cumberland counties where the York is liked best, the survey found only a fourth as many bearing Staymans as Yorks but the young trees of the latter kind fell below the number of young Staymans. (Table 27). In the local-market orchards of the Southeastern Region, where quality is one of the major considerations, the Stayman is much better liked than the York. The growers also reported on what they considered their second most profitable variety. Table 28 shows the results when these records were added to the number of times the variety was ranked as most profitable. In this table Stayman is slightly in the lead of York.

The next most popular variety was the Baldwin. A study of the regions in which this is the favorite, emphasizes the extreme changes in environmental conditions in this State. (Chart XVIII). As soon as one goes east and south of the Appalachian Mountains and into the Cumberland Valley, the Baldwin becomes a late fall apple instead of a winter apple and unless harvested at the right season, it drops badly. For these reasons the Southern and Southeastern Regions do not like the variety. It is by far the best-liked apple in the Northeastern and Western Regions and the northern part of the Central Region.

Ben Davis comes next in the list but this variety is not liked in the local-market regions and Table 29, which gives the list of least profitable varieties, shows that even in the wholesale regions more growers have reported Ben Davis as their least profitable than have reported it as the most profitable but when we add those who selected this variety as their second, most profitable variety, as in Table 28, the total surpasses the adverse vote by a considerable margin.

Northern Spy, Grimes, Jonathan, Rome and Stark all were reported as most profitable by a considerable number of people and here again climate is an important factor. The Spy is thoroughly at home in the Northeastern Region and ranks next to Baldwin in popularity but the variety is little grown in the Southeastern and Southern Regions. (Plates XV, XVI). Grimes and Jonathan, on the other hand, do well in these last two regions and require too long a season to do their best in the region where Spy reaches perfection. Rome and Stark are cosmopolitan varieties and have many desirable characters, both for local market and for the wholesale regions. Rome especially is increasing in popularity because of its regular bearing, its size, good color and good keeping qualities. Smokehouse, one of the best-known Pennsylvania apples, holds a good measure of its old popularity in the Philadelphia region and is highly recommended by some wholesale growers.

Plate XVI Grimes and Jonathan



TOP ROW—GRIMES GOLDEN—BOTTOM ROW—JONATHAN.

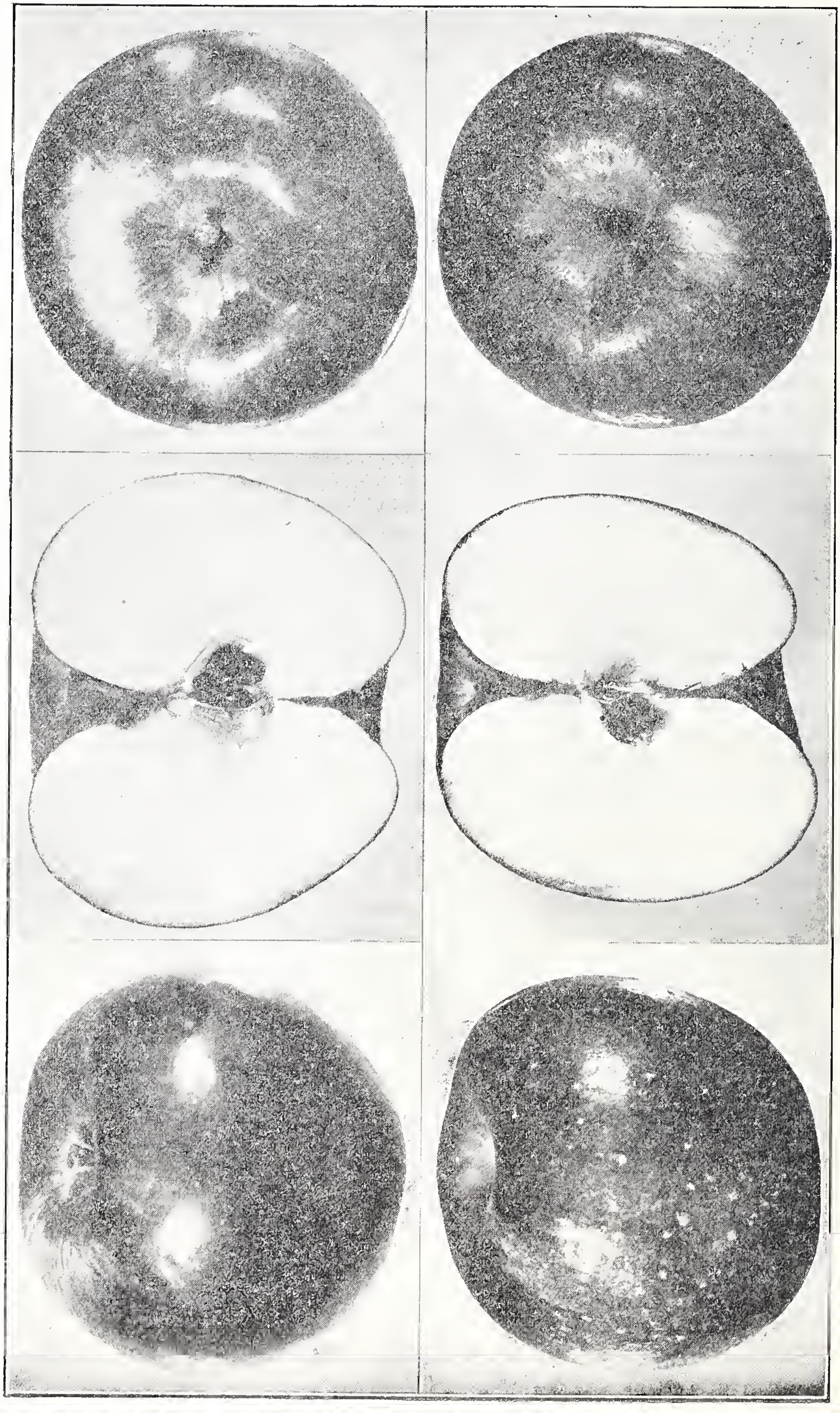
Table 25. VARIETIES REPORTED AS MOST PROFITABLE BY MORE THAN FIVE GROWERS WITH NUMBER REPORTING IN EACH REGION.

Variety	Growers reporting from each region					
	N.Eastern	S.Eastern	Southern	Central	Western	Total
Astrachan	2	1	0	1	2	6
Baldwin	65	0	0	12	31	108
Ben Davis	2	1	13	4	1	21
Grimes	0	2	6	0	0	8
R. I. Greening	6	0	0	0	1	7
Jonathan	0	0	11	1	0	12
Northern Spy	14	2	1	0	3	20
Rome	5	2	0	2	4	13
Smokehouse	1	6	2	1	0	10
Stark	4	2	12	0	2	20
Stayman	7	32	78	9	3	129
Winter Banana	1	1	1	1	2	6
York	1	4	162	13	1	181

Table 26. NUMBER OF GROWERS PLANNING TO PLANT NEW AREAS WITH TOTAL ACRES AND CHIEF VARIETIES BY REGIONS.

	Regions					
	N. Eastern	S. Eastern	Southern	Central	Western	Total
Number growers planning to plant new areas	22	23	122	13	14	194
Number of acres	155	139	2708	99	25	3126
Chief varieties planning to plant.						
Delicious	1	4	7	2	1	15
Grimes	1	4	19	1	1	26
Jonathan	0	2	14	1	1	18
McIntosh	9	0	5	0	1	15
Rome	8	2	6	2	1	19
Stayman	4	15	77	12	2	110
York	0	0	55	1	1	57

Plate XVII Stayman and York



TOP ROW—STAYMAN—BOTTOM ROW—YORK.

Table 27. ACRES SURVEYED OF THE FIVE LEADING VARIETIES IN ADAMS, FRANKLIN AND CUMBERLAND COUNTIES.

	Adams		Franklin		Cumberland		Total	
Variety	Bearing Acres	Non-Bearing Acres	Bearing Acres	Non-Bearing Acres	Bearing Acres	Non-Bearing Acres	Bearing Acres	Non-Bearing Acres
Ben Davis	92	66	276	22	83	60	451	148
Grimes	67	102	185	77	40	159	292	338
Jonathan	26	156	81	88	36	114	143	358
Stayman	315	1150	269	607	98	393	682	2150
York	1675	1421	1006	274	304	395	2985	2090

Table 28. MOST PROFITABLE VARIETIES IN THE DIFFERENT REGIONS AND NUMBER TIMES SELECTED FOR FIRST OR SECOND CHOICE.

	Regions					
Variety	N. Eastern	S. Eastern	Southern	Central	Western	Total
Astrachan	2	1	0	1	2	6
Baldwin	84	2	7	19	44	156
Ben Davis	4	1	28	5	2	40
Black Twig	0	1	4	1	0	6
Grimes	0	11	26	2	2	41
R. I. Greening	6	9	1	0	4	20
Jonathan	0	6	25	3	0	34
McIntosh	5	0	1	0	0	6
Northern Spy	54	3	1	1	10	69
Rome	8	7	6	4	8	33
Smokehouse	2	11	7	3	1	24
Stark	7	2	16	2	5	32
Stayman	9	37	191	14	4	255
Winter Banana	1	1	1	1	2	6
York	2	5	225	16	2	250

Chart XVIII:—The two most popular varieties in each region and total number of times selected for first and second choice.

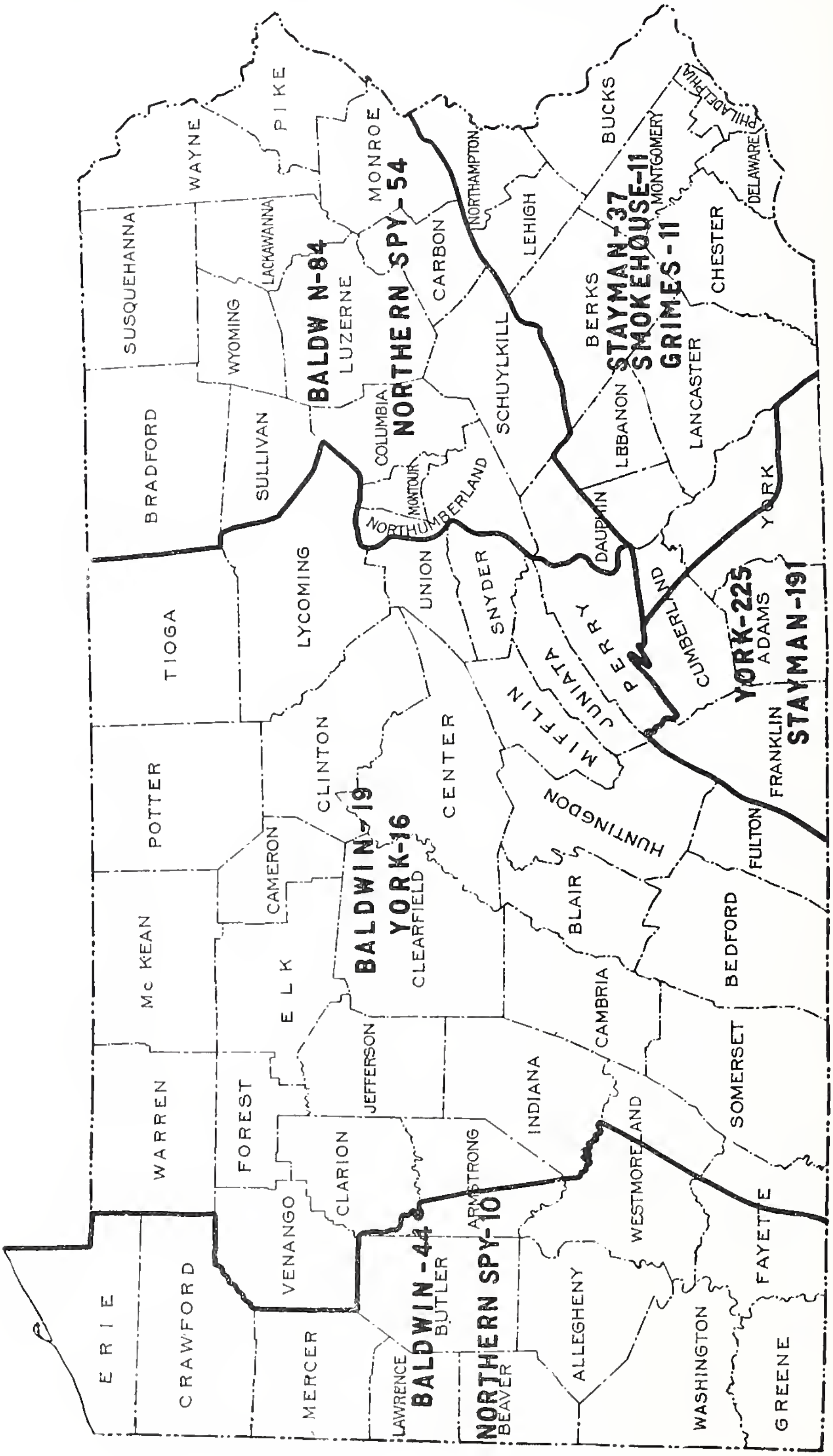


Table 29. LEAST PROFITABLE VARIETIES IN THE DIFFERENT REGIONS AND NUMBER OF GROWERS WHO GAVE THEM THIS RANK.

Variety	Regions					
	N. Eastern	S. Eastern	Southern	Central	Western	Total
Ben Davis	31	11	15	7	13	77
Baldwing	2	9	5	0	2	19
Black Twig	0	9	5	1	0	6
Grimes	1	0	5	0	0	6
R. I. Greening	7	1	0	2	0	10
Northern Spy	5	0	1	0	2	8
Smiths Cider	2	4	8	0	1	15
York	3	9	1	0	2	15

SOILS OF PENNSYLVANIA FRUIT REGIONS.

A reconnaissance soil survey of Pennsylvania was begun in 1908, completed in 1912, and reported in bulletin form by the United States Department of Agriculture Bureau of Soils in five sections, each representing a season's work and a distinct geographical region. A resume and brief of the results of that survey was published by the Pennsylvania State College, 1914, in Bulletin No. 132. The survey was made by the United States Bureau of Soils, with the Pennsylvania State College, cooperating. The same cooperators have undertaken to make a detailed survey of the State based, usually, on the county as a unit and thus far have published reports covering the following counties in whole or in part: Adams, Bedford, Berks, Blair, Bradford, Cambria, Centre, Chester, Clearfield, Erie, Lackawanna, Lancaster, Lebanon, Lehigh, Mercer, Montgomery, Washington and York. At the time of this writing (August, 1921) the field work for Lycoming county has been completed but the report is as yet unpublished and field work is in progress in Greene County.

The Pennsylvania Department of Agriculture has published, in Bulletins Nos. 250 and 257 entitled "Soils of Pennsylvania," a statement of the origin and capacity of the soils of various counties, including a discussion of the same by townships, with suggestions of their adaptation to the different crops grown.

"Pennsylvania Fruit Soils and Soil Variety Adaptations," was discussed by H. J. Wilder in the Annual Report of the Pennsylvania State College for the year 1910-1911.

Inasmuch as the soils of our State already have been carefully classified and described by men especially trained in soil technology, and their adaptations to various crops and to fruit varieties set forth in other publications, the present discussion may be made the more brief by the omission of details that are to be found elsewhere.

Members of the survey crews were constantly surprised to find excellent orchards on some of the less favored soils while some very poor orchards were found favorably located with respect to soil. This is mentioned in order to emphasize the importance of the human equation, as expressed in the old proverb "If vain our toil—we ought to blame the culture, not the soil!"

For apple growing, elevation and at least a moderate degree of slope are valuable as they afford freedom from frost-pockets and provide surface drainage for water as well as for air. Depth of soil is essential to provide sufficient volume for large rooting and feeding, and for the proper availability of moisture from below. Texture, i. e., the size of particles, bears a strong relation to the proper retention and supply of moisture and plant food materials and to the ease of cultivation; extremely light sandy soils dry too quickly and are wasteful of fertilizer in our humid climate because of excessive drainage, and the heavier clay soils are objectionable because of too slow drainage and the consequent difficulty of proper and timely performance of cultural operations. These three conditions then—elevation, depth and texture—are fixed by nature and therefore must be selected with care. Man may, however, by good management, exercise some control over the structure or grouping of soil particles and over the supply of plant-food materials.

In this survey, the largest number of orchards on a given soil class was found on gravelly loam soils, and the next largest on stony loam. (Table No. 30). But we must not conclude that trees benefit from the presence of rock fragments other than to the extent that they may facilitate the drainage and aeration of the soil. Rather, the coincidence of apple orchards and gravelly or stony soils seems due to the fact that such soils are the most common in foothills and situations otherwise well suited to apple-growing. Considering the wide extent of the clay, clay-loam and silt-loam types, the relatively small number of orchards planted on them is significant; such soils are usually too heavy for best results in apple growing.

TABLE 30. NUMBER OF ORCHARDS FOUND ON EACH SOIL CLASS

County.	Clay	Clay loam	Silt loam	Sandy loam	Gravelly loam	Stony loam	Slate loam	Shale loam	Loam	Gravelly sandy loam	Gravelly shale loam
Adams	9	2	2	3	73	20		12	25		
Armstrong		1	2	1	1		1	2			
Allegheny		2	1						9		
Beaver		8		4		1		1			
Bedford		2	6	4	2	20		2			
Berks						2			2		1
Bucks		2		3							
Butler		1		7		2		1			
Blair	1				2	2	1	6			
Columbia		1	1	5				1	2		
Chester			1	1		2			16		
Crawford			1						2		
Cumberland	1	1	2	14	7	4		8	5		
Delaware						1			8		
Erie		2	10	3	3						
Franklin		12	6	14	25	6		3	21	2	
Lawrence		8	2	1	2				11		
Lebanon		1		3	1			3	4		
Lancaster								3	6		
Lackawanna		4	9	1		5			6		
Lehigh									1		
Luzerne		13	9	9		23	2	6	11		
Montgomery		2			3			3	10		
Westmoreland			3						2		
Wyoming		4	1	2	1	6		2	5		
Wayne					1						
York	5			12	7	5	2	16	12		1
Totals	16	66	56	87	128	99	6	69	58	2	2

SOILS OF THE SOUTHERN REGION.

The highly specialized apple-growing counties—Adams, Franklin, Cumberland and York, are divided by South Mountain; Adams and York lie to the east, Franklin and Cumberland to the west of the mountain.

The most popular soils in Adams County[1] are the Porters, Ashe and Penn gravelly loams.[2] All of these soils owe their origin to the breaking down of the underlying rocks. The Porter soils are formed from the weathering of granites and similar rocks, particularly gneiss, which differs from granite mainly in that it contains a good deal of mica which tends to collect in parallel planes and cause the rock to split into thick slabs. The surface clay is gray to light brown; the subsoil a friable, micaceous clay of reddish color. Loam, gravelly loam, and stony loam are the important types.

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[1] The Adams county soil survey was one of the first made in the State and some of the terms and descriptions have since proved inaccurate. Professor A. L. Patrick, Soil Expert of the Department of Agronomy of the Pennsylvania State College, has just completed a review of the soils of Adams County and he has kindly corrected the descriptions of the soils of this region.

[2] **Throughout this chapter the U. S. Department of Agriculture soil names are used. A more detailed description of these soils can be obtained from the several county and reconnaissance soil survey reports.**

The Porter gravelly loam is yellowish-brown to grayish-brown loam to silt loam passing at from 8 to 10 inches into a reddish-yellow silty clay loam, which in turn grades into a red friable clay. Abundant platey fragments of the underlying schist are found on the surface and throughout the soil section. In places, as the vicinity of Idaville, Bendersville, Brysonia, and west of Fairfield, belts of this soil have been derived from a schist rock which locally is known as "Copper Stone," owing to the greenish appearance of the unweathered rock, as well as from the fact that copper ore is associated with it in places.

The important areas of Porter gravelly loam in Adams County are located on the eastern slope of South Mountain. They are deep, well drained soils, which fact, together with their location, makes them ideal apple soils. Many of the local farmers prefer the copperstone phase.

The Ashe gravelly loam differs from the Porter gravelly loam in having a yellowish subsoil rather than red. Its surface soil in many places is somewhat grayer. It is an extensive soil in Adams County where it occupies a large portion of South Mountain. It is not so extensively developed as the associated Porter gravelly loam, due partly at least to the fact that much of it occurs on steeper slopes and on higher hills. This is a deep, well-drained type. Many of the large orchards near Cashtown and elsewhere along the eastern foothills of the mountains are located on this soil. Undoubtedly it will be used more extensively for this purpose in the future. Associated with the Ashe gravelly loam are large areas of Ashe stony loam, which could not be utilized until cleared of many large stones.

The Penn soils are formed from red sandstones and shales. The Penn gravelly loam is an Indian-red gravelly loam with a deeper colored Indian-red loam to clay loam subsoil. It is derived from a conglomerate consisting of quartz and quartzite pebbles and cobblestones embedded in an Indian-red mudstone or fine grained sandstone. The major part of the soil material seems to come from the breaking down of the red material, leaving the quartz and quartzite fragments largely unweathered to form the gravel. This high gravel content has prevented much of the finer material from eroding, consequently this is one of the deepest and strongest soils in this county.

It occurs in the north-central part of Adams County on rather prominent hills which are from two to three hundred feet higher than the low lands to the east and west. Large well-defined areas are located north and west of Biglerville, north and east of Aspers in the vicinity of Gardners, and between York Springs and Gargol. The Penn gravelly loam is as well thought of by the apple growers as is the Porter gravelly loam and seems just as well suited to this purpose.

The Penn silt loam consists of a reddish-brown silt loam or loam soil with an Indian-red silty clay subsoil which rests on the parent red shale, mudstone, or fine-grained sandstone. The bed-rock usually is encountered within the three-foot section. There are strong, well-drained soils but owing to their rather flat topography and low position, only a few of the highest ridges are used for orcharding purposes.

The associated Penn shale loam differs from the silt loam in containing a greater amount of shale fragments and in its shallower depth. It usually occurs on small ridges and slopes.

The Montalto soils are derived from coarse-grained trap-rock (diabase), huge boulders of which are seen in many places which have led to the local term of "ironstone" soil. A number of orchards in Adams county are located on the Montalto silt loam. It is characterized by a reddish brown to yellowish-brown silt loam underlain by a yellowish red or reddish-yellow, friable, clay loam passing quickly into a dull-red, brittle clay containing sufficient mica to lend a greasy feeling. A low ridge of this soil extends in a northeast-southwest direction across the county from the York County line south of Amatus to the Maryland boundary just north of Emmitsburg, Maryland. It varies in width from one to four miles. Numerous other important areas of this soil are found in the eastern half of the county, chief among which are the ridges east of Fairfield, south and east of Orrtanna, east of Hilltown and on Chestnut Hill.

The Lehigh soils occur adjacent to the Montalto soils. They represent weathered shale or fine grained sandstone having a bluish gray to whitish appearance. These rocks have been subjected to great heat and pressure which account for their peculiar color and hardness. The soils resulting from these rocks have somewhat the same color as the rocks. Locally such soil is called "blue land" and is not considered to be very productive. The silt loam type predominates, although in some places gravelly loam is mapped. The latter occupies higher land and is associated with the Penn gravelly loam.

There are a great many other soils in Adams County chief among which are the Lansdale loams, Hagerstown silt loam, Berks silt loam and shale loam and the Manor slate loam. They are not used extensively for orcharding purposes as they occur in the flatter, lower sections of the county east of the South Mountain foothills.

In Franklin County two principal fruit-growing areas are found: The first along the east side of the Cumberland Valley in the foothills of South Mountain and the second along the west side of the valley in the foothills of North, or Blue Mountain. The Montalto and Duffield soils together constitute the more important apple soils of the South Mountain area and the DeKalb and Berks of the North Mountain area. A large number of plantings have been made on the Hagerstown soils of the valley, but mostly adjacent to the foothills and to the more intensive apple-growing areas already mentioned.

The Montalto soils here are similar to the Montalto soils found in Adams County except that in Franklin County they occur along the western slope of South Mountain at a higher elevation than in Adams County. The prevailing type is gravelly loam. Areas of loam are found on the more gentle slopes. Some of this soil is colluvial in origin, having been carried to a lower level than where first formed. These areas are very popular orchard sites.

The Duffield soils are characterized by brown or yellowish brown surface soil and a red, or reddish-yellow, fertile, clay subsoil. The underlying red rock consists of calcareous shale and shaley limestone, fragments of which are found throughout the soil. They are strong, easily-tilled soils which in many ways are the equal of the Hagerstown. The loam and silt types predominate. They occur along the western slopes of South Mountain, separating the higher Montalto soils on the east from the lower Hagerstown soils of the valley. The topography is rolling, broken by steep hills and ridges.

The DeKalb soils are formed from light-colored sandstones, shales, quartzites and conglomerates and are the most extensive soils in the State. The surface soil is gray and the subsoil yellow. Drainage is normally well-established. Silt loam, stony loam, shale loam, and fine sandy loam are the most extensive of the fifteen distinct types recognized by the Bureau of Soils. Their topography varies from rolling to mountainous and of course they vary greatly in their adaptability to fruit growing but in favorable situations they are frequently planted to apples with fairly good results. They occur in Franklin County on North Mountain and Conococheague Mountain, being separated from the Hagerstown soils of the Cumberland and Path Valleys by broad bands of Berks soils.

The Berks soils are formed from brown shales and thin-bedded sandstones. The surface soil is commonly silty in character and the subsoil a silty to shaly clay. Drainage is good and sometimes excessive where the subsoil is very shaly. Throughout the series the shale loam is the predominant type, with smaller areas of silt loam and loam and some occurrences of sandy and fine sandy loam. The largest body of Berks soils occurs just above the limestone valley and extends from the Delaware River across Northampton, Lehigh, Berks, Lebanon, Dauphin, Cumberland, and Franklin counties to the Maryland line. The series seems to be chiefly deficient in nitrogen and organic matter. Its agricultural value is lower than that of the Hagerstown soils, but like them, the Berks is most extensively used for general farm crops. These soils are especially adapted to potatoes and alfalfa and are considered good apple soils.

The Hagerstown soils are formed by the weathering of limestones, usually from rather pure, non-cherty limestones. The surface soil is light brown to gray or yellowish-brown and the subsoil is a reddish-yellow clay or silty clay. Particularly in the silt loam type, there is frequently developed a sub-stratum of grayish to yellowish color lying between the surface soil and the true subsoil. The leading types are the clay loam and the silt loam. Drainage is excellent. Hagerstown soils are justly famed for their productivity when planted to general farm crops and they are the highest-priced farm lands in the State. Many orchards are located on Hagerstown soils where they occur in close proximity to the intensive fruit regions, as in the North and South Mountain areas in Franklin County. Of these, many are quite successful but it is commonly believed that apple trees on such soils tend more to wood growth than to fruit production and that their fruit colors more slowly and not so well as that grown on lighter soils and at higher elevations.

In Cumberland County the topographic features are similar to those described for Franklin County. The most intensive commercial apple growing is done on the northern flank of South Mountain, south of the Harrisburg-Chambersburg Pike on soils of the Murrill, DeKalb, and Hagerstown series. Relatively few important plantings occur in the open valley north of the Pike on the Hagerstown soils, but north of a line cutting approximately through the towns of Newburg and Newville on the Berks soils, is a region extending to the foot of North Mountain in which a large number of good orchards have been developed.

The Murrill soils occur in patches or small bodies only. They are located at the base of the South Mountain slopes and consist of sandstone, shale and quartzite material which has been deposited over the limestone material of the valley. In places adjacent to the Montalto soils some "ironstone" material is mixed with the surface soil.

The portion of the county east of Carlisle is considered in this report with the Southeastern Region.

SOILS OF THE WESTERN REGION.

This region may be divided, for convenience in the consideration of its soils, into two main parts: (1) Beaver, Butler, Allegheny, Washington, Westmoreland, Greene and Fayette counties being covered wholly or largely by residual soils of the closely related Westmoreland and Brooke series; while (2.) Lawrence, Mercer, Crawford and Erie counties are almost entirely covered by glaciated soils mainly of the Volusia and Wooster series. Eastern and northern Butler County, eastern Armstrong County, and the southeastern tip of Crawford County, included in this reigon, have the DeKalb soil, with the Westmoreland soil extending into southeastern Armstrong County. A narrow band of soil of the Warren series crosses eastern Crawford County and the intensive lake-belt fruit region of Erie County is on soils of glacial lake deposit, mainly of the Dunkirk series.

This listing of the soils to be found in the western fruit-region is, of course, not complete; yet it covers practically all the soils that are likely to be used for commerical apple production.

The Westmoreland soils are derived from inter-bedded sandstones and shales, together with layers of limestones and calcareous shales. The limestone is not prominent but material derived therefrom usually enters into the make-up of these soils. They resemble the DeKalb but are browner in color. They occupy a rolling to hilly topography much cut up by the river systems of that region. Drainage is good for the most part, but on the hillsides the surface run-off is frequently excessive and causes severe erosion. The only extensive soil type is the silt loam, which is usually deep and mellow, with a silty clay loam subsoil. As a whole, the series is deficient in organic matter and in lime, but at the same time more productive than the DeKalb. In Allegheny, Armstrong, Westmoreland, Butler and Beaver counties, intensive fruit-producing areas of limited extent have been developed tributary to the industrial cities and towns. They show that the soil and climate are right for apple growing and for peaches, small fruits and grapes as well.

The Brooke soils are of little extent, being found on hilltops above the Westmoreland series, where the layers of limestone occur at the surface or along the slopes where the limestone outcrops. They are brown to reddish-brown at the surface and their subsoil is yellow or mottled and heavier than the Westmoreland soils.

The DeKalb soils of this region are formed from both hard and soft sandstones and thick shales and are similar in appearance to those east of the Allegheny crest. The country they occupy is much eroded by streams, yet fairly deep soils are normally found on account of the position of the under-lying rock. Natural drainage is good on the plateaus but frequently wet spots are encountered at the foot of hills that could be improved agriculturally by artificial drainage. There is little intensive apple-growing on DeKalb soils in the Western Region but apples and peaches are grown sufficiently to indicate the possibility of their successful production.

Of the glaciated soils, the Wooster is the better drained and the more productive. It is more often selected for orchard sites than is the Volusia. Both are derived from light colored sandstones and shales and silt loam is probably the most extensive and important type in both. The Wooster soils have a brown surface and yellow subsoil with no mottlings; the Volusia, a gray surface and yellow to gray-and-yellow mottled, compact subsoil. In the Volusia, drainage is poor, the subsoil frequently being impervious to water. The topography varies from gently rolling to steeply rolling. The Volusia, especially, but also the Wooster, is commonly acid in reaction. In earlier years, these northwestern counties held relatively high rank in apple production in the State but now the commercial production on glaciated soils is largely limited to Lawrence and Erie counties.

In Erie County, as has been suggested, the principal fruit-producing area is that along the lake on soils of glacial formation. The more important soil series is the Dunkirk, and the area of its occurrence from the lake shore to the higher land to the south varies in width from three to six miles. While the grape has been and still is the fruit most intensively grown in the lake-belt, there seems to be an increasing tendency among the growers to diversify their business in order to provide some income in years of grape-crop failure and the apple is thus growing in importance.

The Dunkirk soils are generally level to gently undulating, ordinarily well-drained, having for the most part an open subsoil. The surface soil is light brown to gray and the subsoil yellow, gray or mottled. The more important types are sandy, gravelly and silt loam.

SOILS OF THE CENTRAL REGION.

In all those counties comprising the Central Region, with the exception of Tioga, the most extensive soil series is the DeKalb. Where the Allegheny ridges cross this region there are bands of Upshur soil on the flanks of the mountains and on the low accompanying hills. The soil in the intervening limestone valleys is classified principally as the Hagerstown silt and clay loam. The Reconnoissance Soil Survey mapped, with the Hagerstown series, smaller areas of another, the Frankstown series, which, in Bedford County in particular, has proved especially adapted to the production of apples. Considerable areas of the Westmoreland soils occur in Armstrong and in those parts of Fayette, Westmoreland and Indiana counties included in Central Region. Northern Warren County is crossed by a strip of soil of the Warren series and another composed of the glaciated soils of the Volusia and Wooster series. Glaciated soils cover also the northeastern quarter of Potter county and practically all of Tioga, a series not heretofore described in this discussion, the Lackawanna is associated with the Volusia in Tioga County.

The Upshur soils are formed from thin-bedded sandstones and red shales and are Indian-red or deep red. They are usually closely associated with the DeKalb soil and ordinarily occupy very rolling to mountainous topography. They are similar to the soils of the Penn series of the Piedmont Plateau. Loam, silt loam, shale loam, and stony loam are more common than the occasional sandy loam type. Drainage conditions sufficient on all the types, are excessive on the shale loam and cause severe erosion. Upshur soils, because of their favorable situation, frequently are chosen for orchard planting, and under careful management very satisfactory results are obtained. They occur largely in Lycoming County and in Clinton, Centre, Blair, Bedford, Somerset, Fulton, Perry, Snyder and Union counties.

The Lackawanna soils are considered simply as glaciated Upshur soils. They have the same derivation and almost as red color as the Upshur but, because of the surface admixture of transported, ice-worked fragments of sandstone and slate, they also resemble the soils of the Volusia series. They are of higher agricultural value than the Volusia and afford good sites for orchards. Usually they are somewhat deeper than the corresponding Upshur types and constitute the best drained soils in the sections in which they occur.

SOILS OF THE NORTHEASTERN REGION.

Dauphin, Schuylkill, Carbon, Monroe, southern Luzerne, Columbia, Montour and Northumberland counties lie within the ridge and valley section of the Appalachian Mountain system. About 90 per cent of the agriculture of this section is confined to the valleys, adjacent foot hills, and lower mountain slopes. The principal soils fall within the DeKalb and Upshur series with relatively small areas of Hagerstown soils in Northumberland, Montour, and Dauphin counties.

The soils of Bradford, Susquehanna, Wayne, Sullivan, Wyoming, Lackawanna, Pike, the northern portions of Monroe and Luzerne, and northeastern Columbia counties have been glaciated. The soils are similar to those in northwestern and north-central Pennsylvania, consisting principally of Wooster, Lordstown (the name given to the soils similar to the Wooster when the bed-rock occurs within three feet of the surface), Canfield (not quite so poorly drained as the Volusia), Volusia and Lackawanna. Here as elsewhere in the glaciated sections of the State the better drained soils, mainly the Wooster, Lordstown and Lackawanna are the most sought for by apple growers.

The well-drained second bottom or bench soils which occur here and there throughout these sections near the larger streams form excellent fruit soils except where air-drainage is poor. There are a number of these soils alike in being formed by deposition, but unlike in kind or source of material. The most important of these is the Chenango soil series which represents glaciated sandstone and shale soil that has been transported by streams and redeposited. It is no longer subject to overflow and is characterized by brown surface soil and a yellow or brown subsoil.

SOILS OF THE SOUTHEASTERN REGION.

The Southeastern region is roughly bounded on the north by Blue Mountain and on the west by the Susquehanna River, but it crosses the river and includes eastern Cumberland and York counties. The most important and extensive soils of the region parallel to the topographic features, especially in Dauphin, Lebanon, Berks, Lehigh and Northampton counties. The DeKalb soil of Blue Mountain gives way to a band of Berks soil varying in width from 8 to 12 miles, crossing all these counties. South of the Berks soil is a somewhat broken band of Hagerstown, and the remainder of the region is much broken up into large and small areas of Penn, Chester, DeKalb, Berks, Lansdale, Lehigh, Hagerstown, Conestoga, Herndon, Manor, Edgemont, Lickdale, Cecil and Sassafras soils, some of which are of minor importance and will not be described here.

The principal fruit soils seem to be: in Cumberland, Dauphin, Lebanon, Berks, Lehigh and Northampton counties, the Berks in the north and the Penn and Chester soils in the southern parts; in York County within this region, the Chester, Berks, Lansdale, Manor and Montalto soils; in Lancaster County, the Berks, Herndon, Conestoga, Chester and Manor soils; in Chester County, the Chester, Manor and Lansdale soils; in Montgomery County, the Berks, Chester, Lansdale and Penn soils; and, in Bucks County, the Penn, Lansdale and Chester soils.

The Chester soils are formed from rocks of volcanic origin, particularly from those known to geologists as gneiss, a rock which contains some mica. The surface soil is light brown to yellowish-brown, commonly 8 to 12 inches deep; the subsoil is a yellow to reddish-yellow, gritty, heavy loam to clay. The predominating types are the loam and gravelly loam while stony loam and fine sandy loam are also of importance. The topography is rolling and hilly. Apple production is extensively developed on these soils.

The Manor soils are formed from schists, rocks that cleave or split along fairly definite lines and which usually contain much mica. The surface soil is gray to grayish-yellow and the subsoil a yellowish red, heavy, silty clay. Both the surface and the subsoil contain mica, and the subsoil has the characteristic greasy "feel" of micaceous clay. The surface is commonly a shallow loam. The topography where these soils are found is rolling and drainage is good to excessive. Manor soils are deficient in organic matter and not especially productive, but some promising apple and peach orchards are being developed on them.

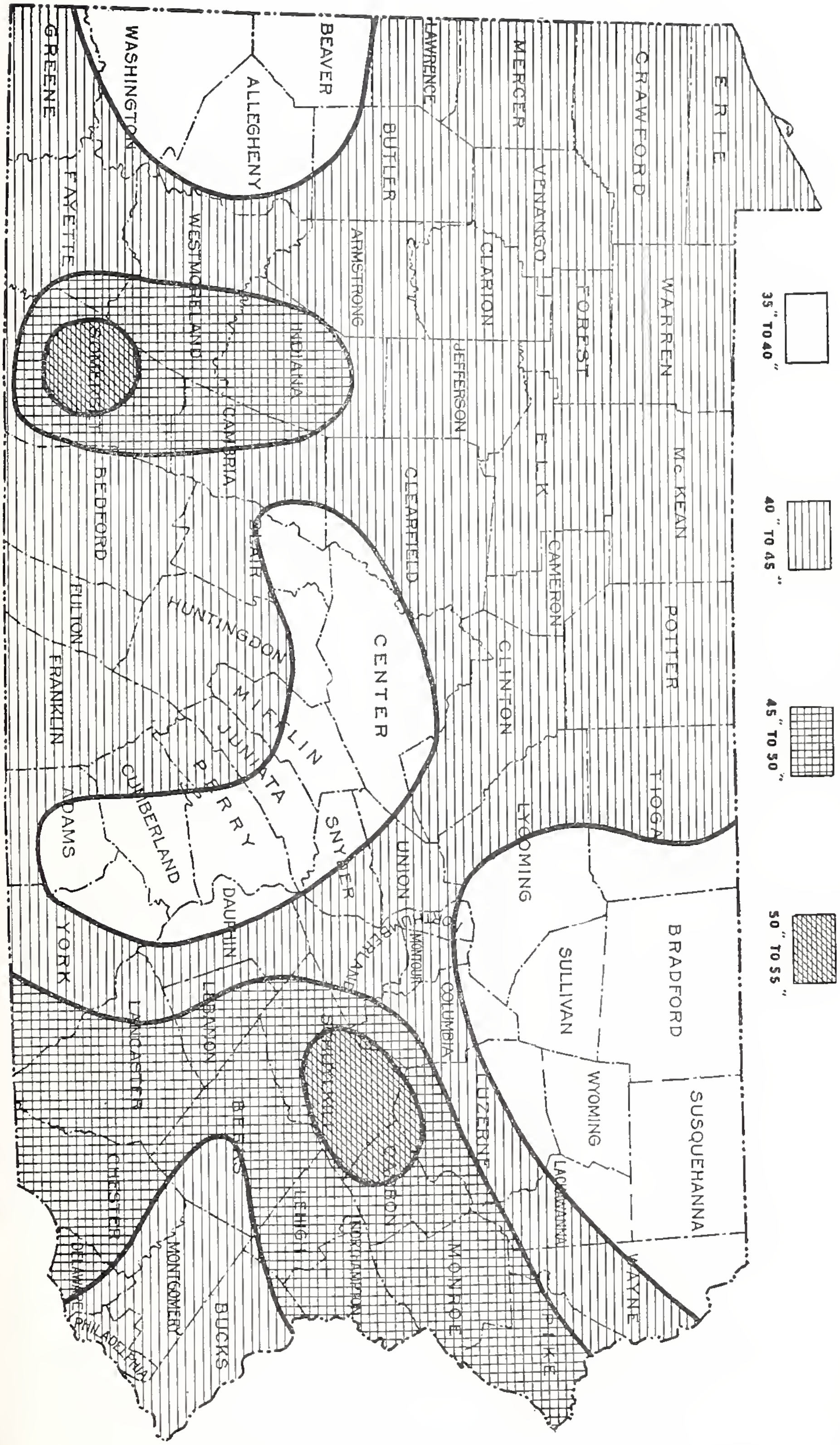
The Lansdale soils occur associated with the Penn soils. In fact they are similar to the Penn soils, which are discussed with the soils of Adams County, except they are derived from brown shale, mudstone or fine-grained sandstone. They have brown surface soils and yellow subsoils and as a rule occupy a rather level topography.

Table 31 is inserted to present to the reader a concrete picture of the distribution of soils, by series names, in those counties in which a considerable number of orchard records were taken. The method of interpretation is as follows: In Adams County 23 orchards visited were on soils of the Montalto series, one on Chester, eight on Hagerstown, three on Lansdale, 61 on Penn, and 56 on Porters soils.

Since the classification of soils in various series is somewhat independent of class (the size of particles), the same classes occurring in many series, a second table, Table 30, to which reference has already been made was prepared to show for each of these counties the number of orchards that was found on each soil class. It shows that in Adams County, nine orchards were found on clay soil; two, on clay loam; two, on silt loam; three, on sandy loam; 73, on gravelly loam; 20 on stony loam; 12 on shale loam; and 25 on loam.

Table 31. NUMBER OF ORCHARDS FOUND ON THE DIFFERENT SOIL SERIES.

County.	Berks.	Chenango.	Chemung.	Cecil.	Chester.	Conestoga.	Duffield.	DeKalb.	Dunkirk.	Edgemont.	Frankstown.	Hagerstown	Herndon.	Lehigh.	Lackawanna.	Lansdale.	Manor.	Montalto.	Murrill.	Penn.	Porters & Ashe.	Sassafrass.	Upshur.	Volusia.	Wooster & Lordstown.	Westmoreland.
Adams,					1							8				3		23		61	56					
Armstrong,								8																		
Allegheny,																										12
Beaver,																										14
Bedford,			1					23			8	7							2				4			
Berks,					1			1				1						1		2						
Bucks,																3						2				
Butler,								6																		4
Blair,								9				1											3			
Columbia,		5						4															1			
Chester,					14			2									4									
Crawford,																								1	2	
Cumberland,	19							4				9						9			1					
Delaware,					9																					
Erie,									13																5	
Franklin,	5						1	11				34				5		27	3							
Lawrence,																								8	14	2
Lebanon,	11																									
Lancaster,	5					1						2	1							2						
Lackawanna,																								25		
Lehigh,	1																									
Luzerne,			5					9							19								1	40		
Montgomery,	2				5											5		1		4						
Westmoreland,																										5
Wyoming,		3																						16	2	
Wayne,															1											
York,	11			4	7					1		9		1		8	8	9		7	1					
Total,	54	8	6	4	37	1	1	77	13	1	8	64	1	1	20	24	12	70	5	76	58	2	9	90	28	[illegible]



NORMAL ANNUAL PRECIPITATION.
(FROM 23 YEAR MEAN)

CULTURAL METHODS.

PLANTING THE ORCHARD.

More Pennsylvania apple orchards are planted in the spring than in the fall, yet when properly done, fall planting seems to have been entirely successful. The older orchard rows usually were planted about two rods apart but experience showed that this was too close for best results in the northern parts of the State and in the later orchards the trees more frequently were set 40 feet apart. In the Southern Region and in the southern part of the Central Region, where orchard planting has been confined almost entirely to the present century, the permanent trees in the older orchards usually are from 30 to 33 feet apart but there is an increasing tendency to give the trees in the younger orchards more room, spacing them about 35 or even 40 feet apart, depending on their vigor and type of growth.

With the use of greater planting distances in the apple orchard fillers have become more popular. Peaches have been used extensively for this purpose and where an early income is needed from the land and the location is adapted to peaches, they have proved fairly satisfactory; but the two fruits need somewhat different care for the best results, therefore many growers prefer to use apples for fillers, sometimes putting them in 20 feet apart or using only the more permanent position in the center of the square made by four permanent trees.

SHAPING AND PRUNING THE TREES.

Up to the middle of the last century the ideal apple tree was one with a head sufficiently high to drive a team under the branches. When this was secured the leader usually was cut out and the tree left to shift for itself. In closely-planted orchards, this treatment ultimately resulted in the tree becoming so high that spraying and harvesting were difficult tasks even with the high towers and extension ladders. When the younger commercial orchards were started, from 1900 on to 1910, the eastern growers were much influenced by the system then being advocated in the Pacific northwest, a system almost the opposite in every feature of that used for the older orchards in the East. As a result most of the orchards planted during this decade were headed very low, were pruned to an open center and kept vase-shaped by rather severe annual pruning.

Experience and study have largely improved eastern methods of shaping and pruning. The extremely low head has been abandoned, although the head is still low enough to necessitate the use of extension tools in cultivating the orchard. The open center trees have broken down seriously under severe sleet storms and winds and systems using a leader or modified leader for the framework of the tree are being tested. Heavy pruning retarded growth and delayed maturity to such an extent that some growers have gone to the extreme of advocating no pruning until the trees are in bearing, a movement in the right direction but one that probably has gone too far.

The most successful growers prune their trees at planting time according to their condition. Trees fresh dug from the nursery need but little cutting back when planted immediately but if they have dried out much in the storage house they may need to be pruned back a half or two-thirds. At the end of the first year those varieties which make a long, sprawling growth are usually headed back again. After that little pruning is necessary with trees that are pruned to a central leader. Any other system of shaping usually requires some pruning to secure and maintain the desired form. When the trees are in full bearing usually they are given a heavier pruning for a few years to thin out crowding branches but too heavy pruning at any time, results in lighter bearing and an increased growth of water-sprouts.

INSECTS AND DISEASES AND THEIR CONTROL.

San Jose scale: Pennsylvania farmers and fruit growers have their full share of trials and tribulations with diseases and insects. The San Jose scale in its first attack nearly wiped out the orchards in some counties and at the present time is again increasing in the western part of the State. The perfection of the lime-sulphur spray and consistent treatment have lessened the fear of this insect to a degree but when we consider that thorough annual spraying in the dormant season at a strength of one gallon of the lime-sulphur to eight gallons of water is necessary in nearly every apple and peach orchard in the State to hold it in check, we must come to realize something of the heavy economic loss chargeable to this unwelcome visitor from the Orient.

Codling moth: An insect of even wider distribution and as great destructiveness is the codling moth, the cause of most of our wormy apples. The usual practice of most apple growers visited during the survey is to spray once only for this insect at the fall of the petals but many of the more careful growers give two and three summer sprays of arsenate of lead, using from a pound to a pound and a half of the powdered form or two to three pounds of the paste form in 50 gallons of spray.

Apple red-bug: The apple red-bug is another sucking insect which in places is causing considerable loss by deforming the fruit. Adams, York, Luzerne, Lackawanna and Wyoming reported it as troublesome. When present in any number, thorough and careful spraying is necessary to hold it in check and this is one of the reasons why more growers are combining tobacco extract with the scab-spray at the fall of the petals.

Red spiders: At the time of the survey, the counties in the Pittsburgh region were in the midst of quite a serious attack of red spiders. The leaves had been so badly punctured that they were losing their normal green color and the vigor of the trees was much decreased. Since many of the orchards in this region do not receive a summer spray of lime-sulphur, this insect probably will increase rapidly unless the growers generally adopt the lime-sulphur spray for summer treatments.

Cankerworms: Western Pennsylvania for several years has suffered from cankerworms. Here again the fact that many trees receive no spraying and others not more than the dormant spray has permitted the worm to spread unchecked. These and most of the other leaf-eating insects are readily controlled by the same arsenate of lead treatment which controls the codling moth yet it is such attacks as these that are rapidly destroying our uncared-for farm orchards.

Curculio: In some parts of southeastern Pennsylvania the curculio is nearly as troublesome as is the codling moth. The same treatment which holds the latter in control also prevents the curculio from doing serious damage.

Aphis and borers: Aphis and the apple borers also were reported as causing damage in most of the counties visited but except in special cases, the damage was light.

DISEASES OF THE APPLE.

Apple Scab: The oustanding diseases of the apple are scab, frog-eye, blotch and fire-blight. Scab can be found in every orchard in the State and, when weather conditions are favorable to its development, the damage in unsprayed orchards is severe. The entire crop may be destroyed by an early attack or so severely injured by later attacks that the fruit is not fit for use except for cider or evaporating. Severe attacks on the leaves sometimes nearly defoliate the trees. Since the severity of the attacks depends on the amount and the time of rainfall, the extent of the control measures will depend largely on weather conditions. The most careful growers combine the summer lime-sulphur spray at a strength of one gallon of lime-sulphur to 40 gallons of water with the arsenate of lead spray to control both scab and codling moth and spray from three to five times, beginning when the blossoms show pink. However many growers apply only two sprays. In many local markets second quality fruit sells nearly as well as does first quality and in the vicinity of these markets, there is a tendency for the growers to spray only once or twice in summer. Thus, in the three counties, where apples are chiefly barreled, Adams, Cumberland and Franklin, with nearly 300 surveys, there were fewer growers found who did not spray at all than in Lackawanna with only 20 surveys. In Lackawanna County, only two growers applied three summer sprays, whereas 135 growers in the three "wholesale" counties sprayed three or more times.

Frog-eye and apple blotch: Frog-eye (black rot) and apple blotch (not the sooty blotch, or cloud) are more especially diseases of the southern and southeastern counties. As a considerable part of the trees in these counties are fairly well sprayed, these diseases are not as destructive as they would otherwise be but in years of serious attacks of frog-eye, it is not uncommon to see trees nearly defoliated by the disease although the usual three summer sprays of lime-sulphur would have held it in check. Apple blotch requires a late spray of Bordeaux and this is sometimes found in orchards that were well-sprayed earlier in the season with lime-sulphur. This disease is especially bad on the old Pennsylvania variety, Smith Cider. Blotch seems to be extending its range northward slowly.

Fireblight: Fire blight is considerably more destructive in Pennsylvania than in States farther north. This may be due to the heavier rainfall and a greater growth of the succulant tissues in which this disease thrives. On old trees the damage is seldom serious but in young trees the cankers may girdle the larger limbs or when suckers or water-sprouts are attacked, the trunk itself may be girdled and the tree destroyed. Cankers on the trunk and at the ground level have for several years caused considerable damage in the Southern Region, especially on Grimes Golden. Cutting out the disease is the only cure and this is not easy to do when the infection is heavy. Fire-blight is especially severe on pears and one of the reasons why pears have decreased in number in this State is the fear of our apple growers that their trees may become infected with blight if they should plant pears nearby.

Crown gall: Few growers in the Southern Region realize the extent to which crown gall is injuring their orchards. In the mor northern States, where a considerable proportion of the nurser stock planted in this State is grown, this disease does not seem t be so serious and the northern nurseries have sometimes failed t use proper precautions to prevent sending out diseased trees. I Adams and Franklin counties are many orchards where a large proportion of the trees are infected with this disease. Many of the tree are attacked to such an extent that their normal growth is checke their yield decreased and in too many cases death results at a tim when the trees should just be reaching their prime. The diseas does not seem to be as destructive in the northern part of the Stat but even here the danger is too great to run any risk. All grower should be certain that every order of nursery stock is given a rigi inspection by a State nursery inspector before any trees are plante

Cedar rust: Cedar rust has caused trouble in the southern countie but the campaign of the Pennsylvania State Department of Agriculture to eradicate cedars in regions where apple-growing is an important business is aiding to check this disease.

Sooty blotch, Phoma spot, Baldwin spot and Jonathan spot occu all over the State and occasionally are so prevalent as to cause considerable damage.

FROST DAMAGE TO APPLES.

In addition to the injury from insects and diseases, frost damag is at times a serious factor in reducing profits from apple growing Reports of losses from the late spring frosts of 1919 were hear all over the State and some regions suffered slightly in 1920. In th spring of 1921, while this survey was being prepared for publication, the State was visited by one of the most destuctive series c frosts in its entire fruit history. During the last three years i several regions frosts have occurred in such a way as to destroy th apple crop without serious injury to nearby peaches.

Of all the many factors that limit success in fruit growing i Pennsylvania, probably none should receive more careful consideration when a site is selected for a new orchard than that of frost injury. Good air drainage is as important as good water drainage The topography of the State is so irregular that the available record of the U. S. Weather Bureau are of only minor value. The experience of farmers and fruit growers in locations similar to the proposed site is the best guide.

SPRAYING AND DUSTING EQUIPMENT.

Too large a proportion of the orchards of the State are unsprayed · receive inadequate spraying. This is one of the chief reasons why ıe State now has over a million less trees of bearing age than ten :ars ago and this, in spite of the heavy planting which has prevailed over the past 20 years. On a total of nearly 740 farms sur- :yed, there were 524 spray rigs and 52 dusters. Of the spray rigs, ’ were barrel pumps. (Table 33). The number of acres sprayed :r day is extremely variable, even when only power-rigs were con- dered, because of the wide range of efficiency resulting from the se of different rigs, the variation in the number and size of trees ıd the distance from avaiable water. With trees from six to ten :ars old, a total of more than ten acres usually was covered; in ·chards with trees from eleven to twenty years old, most of the ·owers would cover from five to ten acres. Almost the only or- ıards that were much over 20 years of age were in the Northeast- n, Central and Western Regions, where trees at this age reach a rge size. In these regions also many of the less efficient spray achines were found, so it is not surprising that five acres was ›out the average area covered in a given day.

Before discussing these averages it is desirable to know some- ing of the amounts of spray applied per acre. The average nounts ran considerably under 100 gallons per acre for trees rang- g from eleven to twenty years of age, even in the best commercial ctions, and for older trees it was seldom that more than 150 gal- ns were used.

The averages of acres covered and of materials used are all too nall. Fruit-growing is just as much a business as manufacturing ıd only those will succeed who have a reasonable margin between .e cost of production and the sales value. Labor usually is the rgest item of expense that figures in the cost of producing apples ıd if only 500 gallons of spray are applied in a day with a power- g, the spraying cost is too high. The sales value depends to a rge extent upon the percentage of clean fruit and 100 gallons per ·re for each spraying are not sufficient to keep the fruit on mature ees clean from scab or frog-eye or to control aphis or red-bug. Ef- :iently conducted spraying on mature trees needs at least 200 gal- ns per acre and 1000 gallons should be a minimum for a day's work.

The survey disclosed the fact that more spray guns than rods are ;ed in the State. Practically all of the large, commercial orchards ıe guns on all or part of their rigs though, in 1920, there was a

AN ERIE COUNTY PLANTING OF PRUNES AND APPLES THAT RECEIVES CAREFUL SPRAYING tendency to go back to the rod because some growers thought they suffered greater burning of foliage and russeting of fruit where they had used guns.

War-time conditions and scarcity of labor drove a number of people to use only one man on a power-sprayer but in two-thirds of the cases two men were used and in nearly one-third of the orchards three men were used on the power-rig. Nearly all hand-rigs were operated with two men.

Dusting is still in an experimental stage as far as its use on the apple is concerned yet 53 dusters were found. The number of acres reported covered in a day ranged from 25 to 50. Usually a crew of two men was employed.

The numbers of the various kinds of spray rigs found on the survey as shown in Table 32 is not entirely accurate from a fruit-grower's viewpoint since certain ones are purchased because they can be used both for apple spraying and potato spraying.

The visits to many hundreds of orchards in Pennsylvania by members of the survey showed clearly the need for more and better spraying. The lack of this has destroyed trees which should now be in their prime and whose value to the State would run high in the millions of dollars. More of our growers must spray and many who now spray must do more careful work if Pennsylvania fruit is to have the high standard of excellence necessary to meet the competition of other states.

SOD AND CULTIVATED ORCHARDS.

In our commercial orchards, emphasis has been placed on the importance of good cultivation but in Pennsylvania certain localized conditions make sod culture of very considerable importance. Pennsylvania orchards are hillside orchards to a very large extent and the soils available are frequently extremely susceptible to erosion. The slope and the nature of the soil combined make cultivation difficult. The annual rainfall is considerably heavier in Pennsylvania than in the western New York fruit belt where it is usually below 35 inches. In some of our fruit regions it is over ten inches more per year and in limited areas in the mountains the annual fall is over 50 inches (Chart XIX). This, with the longer growing season, seems to enable the apple to thrive in sod here much better than it has in sod in New York or Ohio. Also the fruit growers of this State have more generally adopted the plan of using nitrogenous fertilizers in the sod orchard. The result has been that large areas are now in sod. Nearly a third of the acres covered in the survey had been in sod three or more years in the last seven. (See Table 33).

Less than 25 per cent of the total sod area is cropped for the hay. On the remainder it is either cut and left to decay or dies down in season. This feature with the extent to which fertilizers are used, shows that the land is not neglected. In the Central, Northeastern and Western Regions more bearing orchards are in sod than are under cultivation but in the Southern and Southeastern Regions this order is reversed and in all regions most of the orchards under ten years old receive cultivation.

FERTILIZERS.

The number of growers using either commercial fertilizers or manure with some degree of regularity was suprisingly large. Two-thirds of the sod orchards received some fertilization and when we consider that many of our less-intensively managed orchards are in sod this proportion is high. The very small number of cultivated orchards that received no fertilizers (Table 34) was also a surprise in view of the fact that several experiments conducted by the Pennsylvania State College over a period of more than ten years failed to show a profitable return from the use of fertilizers in cultivated orchards although the use of nitrate of soda on the sod orchards did pay very well. More than half of the sod orchards that received no fertilizers whatever were reported in poor condition.

A considerably larger number of growers used animal manures than used commercial fertilizers. More men applied manure every three years or at longer periods than applied it every year. About the same number applied manure every other year as opposed to those who used it every year. Most of the growers who used commercial fertilizers, applied them every year. The manure applications were not heavy, only a few growers put on more than ten tons to the acre and nearly as many used five tons as used ten, while ten per cent of the growers using manure at all used less than five tons to the acre. The one nearly standard mixture of commercial fertilizer was nitrate of soda and acid phosphate but there is no great uniformity as to the proportions of each used or as to the amounts. The most commonly used mixture is one containing two parts of acid phosphate and one part of nitrate of soda. On mature trees from 10 to 15 pounds of this mixture is used. Bone-meal is used by some growers in Adams County and a few growers apply sulphate of ammonia.

Two-thirds of the fruit growers applied fertilizers before May 1, but a few did not get it on until July. Recent experiences of our fruit investigators in several of the Experiment Stations seem to indicate the advisability of early applications of fertilizers.

Table 32. SPRAY RIGS AND DUSTERS FOUND ON SURVEY.

Aspinwall Potato	1	Hays	67
Atsco	10	Hurst	3
Brothers	1	Hercules	13
Bean	26	Iron Age	13
Champion	1	International	9
Consolidated	1	Little Wonder	1
Domestic	36	Moreland and Merle	1
Deming	13	Myers	72
Deyo-Macy	6	New Way	4
Field Force Pump Co.	92	Niagara	1
Finch	1	Owen Compressed Air	1
Friend	42	Stahl	1
Fairbanks, Morse	2	York	2
Gould	24	Barrel Pump	27
Hardie	39	Home made	25

Gravity System,	1
Total,	524

DUSTERS

Niagara,	33
Kansas City,	20
Total,	53

Table 33. ACRES OF APPLES IN CULTIVATION AND IN SOD.

Orchards 10 years old or older: Years in sod

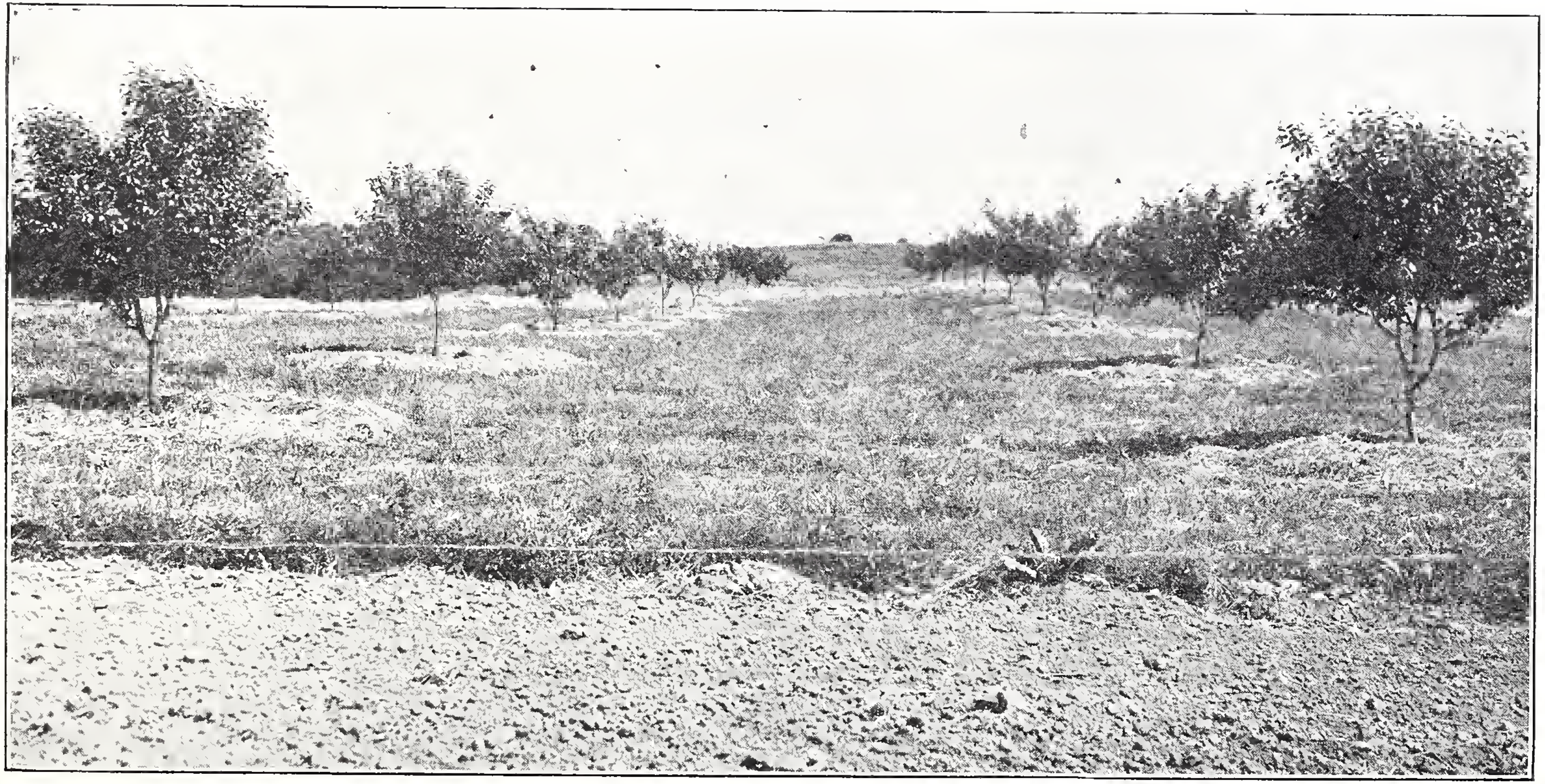
	Cultivated every year	1	2	3	4	5	6	7	In sod 3 or more yrs out of 7
Northeastern	396	6	60	13	6	41	65	763	861
Southeastern	318	0	9	60	7	53	2	145	267
Southern	3429	90	228	130	205	337	114	1191	1977
Central	301	8	8	25	39	20	2	433	519
Western	363	-----	-----	102	-----	4	21	371	498
Total	4807	104	305	330	257	455	204	2876	**4122**

Orchards under 10 years old

	Cultivated every year	1	2	3	4	5	6	7	In sod 3 or more yrs out of 7
Northeastern	419	26	6	4	20	36	9	96	165
Southeastern	860	12	13	-----	16	-----	18	83	117
Southern	6391	201	191	80	161	76	2	125	444
Central	521	21	-----	9	13	-----	-----	35	57
Western	242	-----	3	-----	1	-----	10	107	118
Total	8433	260	213	93	211	112	39	436	**901**

Total acres cultivated every year ---------- **13,517**

Total acres in sod 3 or more years in the last 7 ---------- 5,295



APPLE ORCHARD ON ALFALFA SOD. THE HAY RAKED AROUND THE TREES.

TABLE 34. FERTILIZER TREATMENT AND RESULTS.

Number of Orchards Receiving the Different Treatments

Treatment	Regions	Condition of Trees Good	Medium	Poor	Total.
Sod with fertilizers	Northeastern	28	33	7	68
	Southeastern	8	8	1	17
	Southern	38	31	8	77
	Central	8	4	2	14
	Western	18	10	2	30
Total		100	86	20	206
Sod without fertilizers	Northeastern	6	6	15	27
	Southeastern	2	1	0	3
	Southern	5	4	16	25
	Central	1	3	10	14
	Western	6	12	11	29
Total		20	26	52	98
Cultivation with fertilizers	Northeastern	15	14	1	30
	Southeastern	30	5	1	36
	Southern	165	62	5	232
	Central	9	9	0	18
	Western	22	3	0	25
Total		241	93	7	341
Cultivation without fertilization	Northeastern	1	2	3	6
	Southeastern	1	0	0	1
	Southern	4	13	6	23
	Central	1	1	6	8
	Western	1	2	1	4
Total		8	18	16	42

PLOWING AND CULTIVATING.

In the cultivated orchards considerable variation in the time of plowing was noted. More than one-half of the orchards reported were plowed as early as possible and nearly half the remainder were plowed during April, thus three-fourths of our orchards under cultivation, probably are plowed before blossoming time. The experience of some of our growers in the colder portions of the State during the winter of 1917-1918 shows the danger from plowing too late; orchards plowed in June 1917, did not have time to mature the new growth started by the plowing and cultivating and were seriously injured by the low temperatures the following winter while adjoining trees not plowed came through safely. That too large a proportion of our orchards are plowed too late in the season is shown by Table 35.

The number of times the cultivated orchards were gone over in the summer is instructive as indicating something of the degree of care they received. The largest group of growers cultivated four times but nearly as many went over their orchards from five to seven times. Why six times seemed to be so unpopular is not apparent. It was gratifying to find that the number cultivating only once was so small as to be negligible. (Table 36). The third week in July marks the cessation of cultivating and the time of seeding a cover crop but a few already had stopped before July. The number carrying their cultivation beyond the first week in August is not large and it is doubtful if cover-crops sown as late as this will give sufficient growth to supply the needed humus. (Table 38). Late cultivation also tends to produce a lack of color in the fruit and contributes to the poor maturity of wood.

Table 35. PLOWING DATES ON FARMS SURVEYED.

Number of Growers Plowing Orchards at Different Dates.

		April				May				June				Total
	Early as possible	1st wk.	2nd wk.	3rd wk.	4th wk.	1st wk.	2nd wk.	3rd wk.	4th wk.	1st wk.	2nd wk.	3rd wk.	4th wk.	
1919	80	17	25	7	18	15	14	3	5	14	3	2	4	207
1920	77	9	30	3	16	16	14	2	2	17	7	1	4	199

Table 36. CULTIVATION: NUMBER OF TIMES DIFFERENT GROWERS CULTIVATED THEIR ORCHARDS.

	1	2	3	4	5	6	7	Total.
1919, ...	1	24	47	53	50	15	50	240
1920, ...	3	28	43	60	50	16	42	242

Table 37. DATE OF LAST CULTIVATION: NUMBER OF GROWERS AND DATE OF LAST CULTIVATION.

	June	July				August				Sept.	Total.
		1st. wk.	2nd. wk.	3rd. wk.	4th. wk.	1st. wk.	2nd. wk.	3rd. wk.	4th. wk.		
1919, ...	15	31	12	39	31	33	6	8	16	9	250
1920, ...	13	31	10	38	36	32	7	8	19	11	246

COVER CROPS.

The most commonly used cover-crop is one utilizing the clovers. Crimson clover or one of the red clovers is used either alone or mixed with other legumes. Crimson clover does well in most locations in the Southern and Southeastern Regions and is widely used but usually it fails to go through the winter in the colder regions. Of the non-legume covers, rye is most used and it usually forms the base of the non-legume mixtures in combination with buckwheat or oats. A considerable number of orchards are not seeded, the growth of weeds being depended on for the cover. (Table 38). This is very satisfactory in many orchards but sometimes leads to a spotted stand. Vetch is not used as widely as its many good qualities would seem to justify.

Some growers apparently have failed to appreciate the importance of maintaining the humus content of orchard soils and have not paid sufficient attention to growing cover-crops. Most of the chief orchard soils of the State are deficient in humus and no phase of orchard management gives larger returns than maintaining the organic content of the soil and increasing the supply of available nitrogen.

Table 38. COVER CROPS: NUMBER OF GROWERS USING DIFFERENT KINDS OF COVER-CROPS.

Year	Weeds	Clover	Rye	Buckwheat	Mixed Legumes	Mixed Non-Legumes	Total.
1919,	44	96	20	11	21	33	225
1920,	43	91	23	8	22	26	213

THINNING.

It is the practice of only a few of our growers to thin their apples and what little is done is confined almost entirely to the southern, carlot region. Here is seen an interesting difference between Adams and Franklin counties. Of all the men visited in Adams County, only five practiced thinning as a general rule while in Franklin there were 30. This is due very likely to the different methods of marketing; Adams County could dispose of the inferior grades through the local by-products plants better than Franklin which has practically no canneries or evaporators. Nearly three-fourths of the thinning is done in July and the rest in August. A few growers still think that thinning influences the size of the crop of the succeeding year, but there is no evidence that this is the case. However, thinning does increase the proportion of first quality fruit the same year and simplifies both picking and packing.

MARKETING PENNSYLVANIA APPLES.

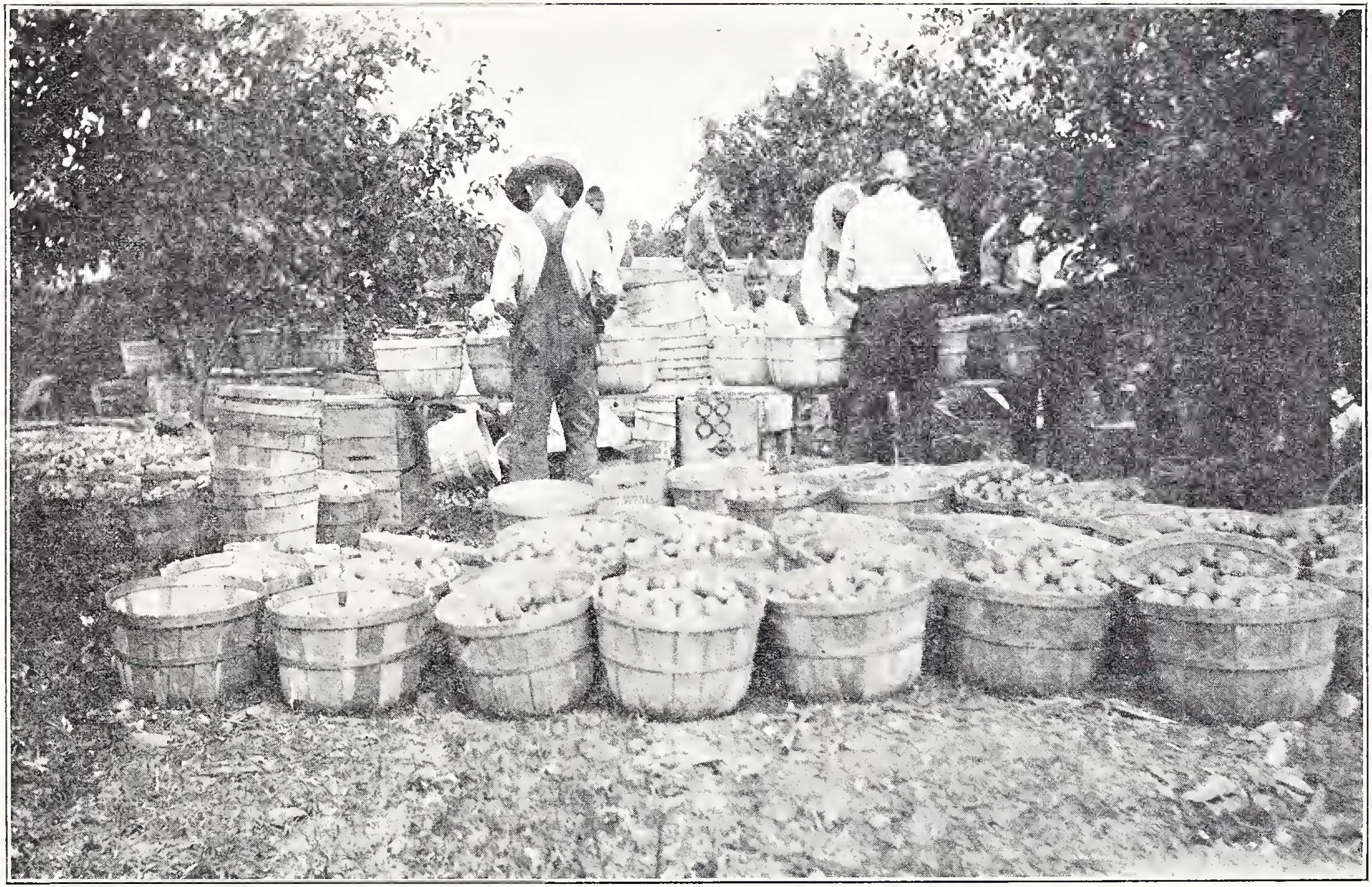
Size of Picking and Packing Crew.

In addition to studying the number of acres of orchard handled by each extra laborer at picking time, (See Table 24), the number of bushels harvested by crews of different sizes was studied. It was not possible to separate the packers from the pickers as on most farms they were not kept separate and so only the total number in both crews was considered. Taking all farms for which information was available, about 350 bushels were harvested for each person in the crew during the season. This average is very small because of the large number of farms where less than 500 bushels were harvested.

On farms where not more than 500 bushels were picked the average crew consisted of three persons. Usually only one was added to the crew when 1000 bushels were picked. To handle 2000 bushels required a crew double this size or eight men and to pick 3000 to 4000 bushels increased the crew two men for each thousand bushels increase. Approximately this ratio of increase will hold for all orchards yielding more than 2000 bushels so we can say that, on the average in orchards of this size, 500 bushels of apples are harvested for each member of the picking and packing crew. This would seem to indicate a lack of efficiency and economy as well, on the smaller farms where the harvesting of 500 bushels requires, on the average, three men. (Table 39).

Table 39. APPROXIMATE SIZE OF PICKING AND PACKING CREWS.

Number bushels harvested per farm, ..	Less than 500	1,000	2,000	3,000	4,000	5,000	6,000	7,000
Size of crew, ...	3	4	8	10	12	13	15	18



PACKING APPLES IN ROUND-BOTTOM BUSHEL BASKETS IN SOUTHERN PENNSYLVANIA.

GRADING AND PACKING THE CROP.

With the exception of those counties wholly or partly in the Southern Region, nearly all the commercial crop of Pennsylvania goes into local markets and is sold in open packages. For this reason the apples are not graded as carefully as are those for barrel packing. Over 50 of the men in the local market regions who reported their grades, sold their fruit as it ran after the culls had been thrown out, while less than forty graded the fruit into two sizes after removing the culls. The use of standard grades was confined very largely to the Southern Region; here over 100 of the men reporting on the survey packed in this way. A few growers in the local-market regions sold in hampers, round-bottom bushels, or the western box, and these men usually adopted the standard grades. The difference in the marketing methods in Adams County as compared with Franklin, Cumberland and parts of York again is seen in the way the growers grade their fruit; more Adams County growers sold their fruit "orchard run" than packed under any of the commercial grades, while in the adjoining counties only a very small proportion sold "orchard run."

The fruit harvest in the local-market regions extends through a long period and a large part of the fruit is taken directly to market as it is picked. When the winter varieties are harvested they are stored on the farm either in bulk or in the picking crates so there is no special need for a packing-house. Conditions in the Southern Region, however, are entirely different. Here the commercial orchard consists of only a few varieties harvested over a short period and usually sent direct to market or to some distant storage. As a result the packing must be done quickly and economically and the larger growers have found it necessary to build special packing-houses. As yet the central, cooperative packing-house has not been tried in this State although there is one successful packing-house owned by a group of growers in Adams County.

The bushel slat crate is found throughout the local-market regions and is used for picking, storing and marketing. It is the most universal package in the regions, although some growers use second-hand orange boxes and similar packages which they pick up around the grocery stores where their fruit is sold. In the Southern Region, while the barrel is still the standard package, the round-bottom bushel is being used more and more for fall varieties of apples.

Seventy-three graders are in use throughout the State, on the farms visited but of course most of these were located in the Southern Region where a large part of the fruit is graded according to the accepted commercial grades. (Table 40).

The State of Pennsylvania at present has no law governing the grading of apples. The head of the barrel may be marked "Extra fancy" and yet every apple in the barrel may be a cull. To correct this pernicious practice a grading law has been proposed but the growers should be awake to the fact that honest grading and labeling constitutes the one lasting advertisement and should not wait for the passage of any law compelling them to observe principles of common honesty and fair dealing. Experience has taught many Eastern growers who ship their apples to distant markets that a standardized product brings the highest price always.

The crop of 1920 was unusually heavy and many growers found difficulty in marketing their fruit. A large proportion of the crop in the fruit region of Western New York was put up in local, cooperative packing-houses under grades established and maintained by a central inspection service. The results were so satisfactory that the same plan was tried with peaches in 1921. The following from the Market Reporter, September 19, 1921, may be taken as an index to the good results that will follow the adoption of standardization:

"The practicability of the tentative peach grades proposed by the Federal Bureau of Markets and Crop Estimates has again been demonstrated under large scale commercial operations in western New York. Twenty local cooperative organizations, working under a central selling association, put up their entire peach pack this season upon the basis of these grades.

"Only peaches conforming to the No. 1 requirements were packed under their widely advertised brand and the high quality of the output was the cause of exceptionally favorable comment by many buyers. The premium generally secured for such stock was concrete evidence of its excellence and of the value of proper grading. There was no difficulty in the mechanical operation of grading. The sizing in one-quarter inch variations seemed to be popular."

Granting that it will pay to grade to uniform standards apples that are to be shipped, the question arises will it pay to grade fruit for the local market? The proposed grading law does not cover apples sold in open packages such as the slat crate and, in the event of such law being passed, no grading will be required. However, a few growers on every local-market in the State grade as carefully as any of the growers who pack in barrels. Such men have sprayed and fertilized and so have fruit well-adapted to grading and the prices they receive more than justify the extra cost of careful, conscientious packing.

Pennsylvania today has a large acreage of young orchards just coming into bearing. If the apple industry is to prosper an increasing demand must be developed for the products of these orchards.

Putting a few good apples on the top of the crate to help sell the culls in the bottom surely will not make a satisfied customer, the best asset the fruit grower of the State can have.

TABLE 40. KIND AND NUMBER OF GRADERS FOUND ON FARMS SURVEYED.

Burke	2	Jones	1
Cutler	3	Pease	17
Gordon	1	Trescott	39
Hardie	3	York	1
Homemade			3
Name not reported			3
Total			73

HAULING THE CROP TO MARKET.

In the carlot region where the fruit usually is carried to the nearest shipping point, the hauls average a little more than three and one-half miles or about a mile and a half shorter than in the local-market regions. Very little fruit for carlot shipment is hauled over 10 miles but in nearly 15 per cent of the local-market orchards, the haul is over 10 miles. This is one of the reasons why, in the local-market regions, nearly 50 per cent more trucks than teams are used for hauling whereas in the wholesale regions the order is reversed, more teams are used than trucks. Another and possibly the chief reason for the greater proportion of trucks in the local-market regions is the need for more frequent trips to market. Table 41 gives the makes of trucks in hauling apples.

As would be expected from the fact that the orchards usually occupy hillsides and hilltops, few have level hauls to market, and most of the fruit goes over roads that are moderately steep. The least dsirable location from the standpoint of roads, seems to be that involving a steep uphill haul, since the smallest number of orchards were found in such situations and when orchards were planted on such sites, only those nearest to market are used. Whether the roads are good or poor, dirt or stone does not seem serriously to affect the utilization of good sites for orcharding until the hauls become about twice the average. The long hauls, those above 12 miles, are largely dependent upon improved roads in good condition.

TABLE 41. KIND AND NUMBER OF TRUCKS USED IN HAULING APPLES.

Atlas	2	Little Giant	1
Bessemer	1	Maccar	2
Bethlehem	1	Mack	4
Cadillac	2	Maxwell	6
Chevrolet	2	Martin	2
Commerce	4	Norwalk	1
Dayeldor	1	Oldsmobile	1
Denby	2	Packard	1
Ford	58	Pullman	2
Garfield	1	Reo	10
Giant	1	Republic	18
G. M. C.	1	Seldon	1
Hudford	1	Stewart	3
International	16	Vim	2
King	2	White	3

Name not listed	23
Hired trucks	11
Touring car used for hauling	11
Total	199

TYPES OF ORCHARDS.

As has been stated many times two types of orchards are noted in the State: (1) Those where the fruit is sold in some nearby market, and (2) those where it is packed and shipped to a distant market. Thus, we have two distinct types of marketing problems.

When the apples go to a local market, one must know the likes, dislikes and peculiarities of that particular market and also when the market is supplied from other competing sources. The question of storage on the farm or in local cold storages and the facilities for truck transportation also are important; and last, but by no means least, the orchard must be planned to give a succession of varieties so that the grower may hold his market throughout the season.

In the carlot shipping areas, there is a strong tendency for many small growers to pass their marketing problems on to someone else by selling their fruit to some local shipper or to a receiver at a distant market.[1]

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[1] Mr. W. C. Lynn, of the Bureau of Markets Pennsylvania Department of Agriculture spent the fall of 1920 studying the marketing of Pennsylvania apples and much of the following discussion of marketing was prepared by him for this report.

Marketing in itself is a broad and interesting subject and one with which every grower must deal to some degree. It may consist only of selling small quantities of fruit on a retail market or it may consist of sales of an extensive nature direct to receivers or through syndicates. All methods of selling may be grouped into three main classes, as follows:

COMMERCIAL

1. On contract before picking.
2. F.O.B. local shipper.
3. F.O.B. receiver.
4. Commission sale.
5. To carlot broker.
6. Through an association.
7. Through a syndicate.
8. To cannery, drier, or cider manufacturer.

SEMI-COMMERCIAL

1. To local wholesaler.
2. To truck jobber.
3. On the wholesale market.

RETAIL

1. To retailers.
2. On the retail market.
3. Huckstered.[1]

Table 42 shows the tendency existing in the various regions of the State to use these three methods of sale and the different ways in which they are used. This shows that Adams, Cumberland and Franklin counties form the strictly commercial section of the State. Other counties, as Bedford, Erie and York are partly commercial in tendency, that is, in some sections of the counties quite a commercial attitude is taken. Retailing is the prevailing method of marketing apples among the growers in the counties surrounding Pittsburgh, in the Wilkes-Barre-Scranton region, and in the southeastern part of the State.

MARKETING IN THE SOUTHERN REGION.

This district is the largest and most active commercial section in the State. It is the upper part of the large fruit belt extending down into Maryland, West Virginia and Virginia and though geographically it is not confined entirely to the Cumberland Valley it is frequently spoken of as the Cumberland Valley region.

Apple acreage and production in this region are increasing year by year and with these come additional problems in the successful marketing of the crop, and in finding new methods whereby more favorable results may be secured. Commercialism of the apple industry, toward which there is a growing tendency, is dependent not only upon such factors as pruning, spraying and scientific cultural management but also to a large extent on transportation, marketing and existing economic conditions.

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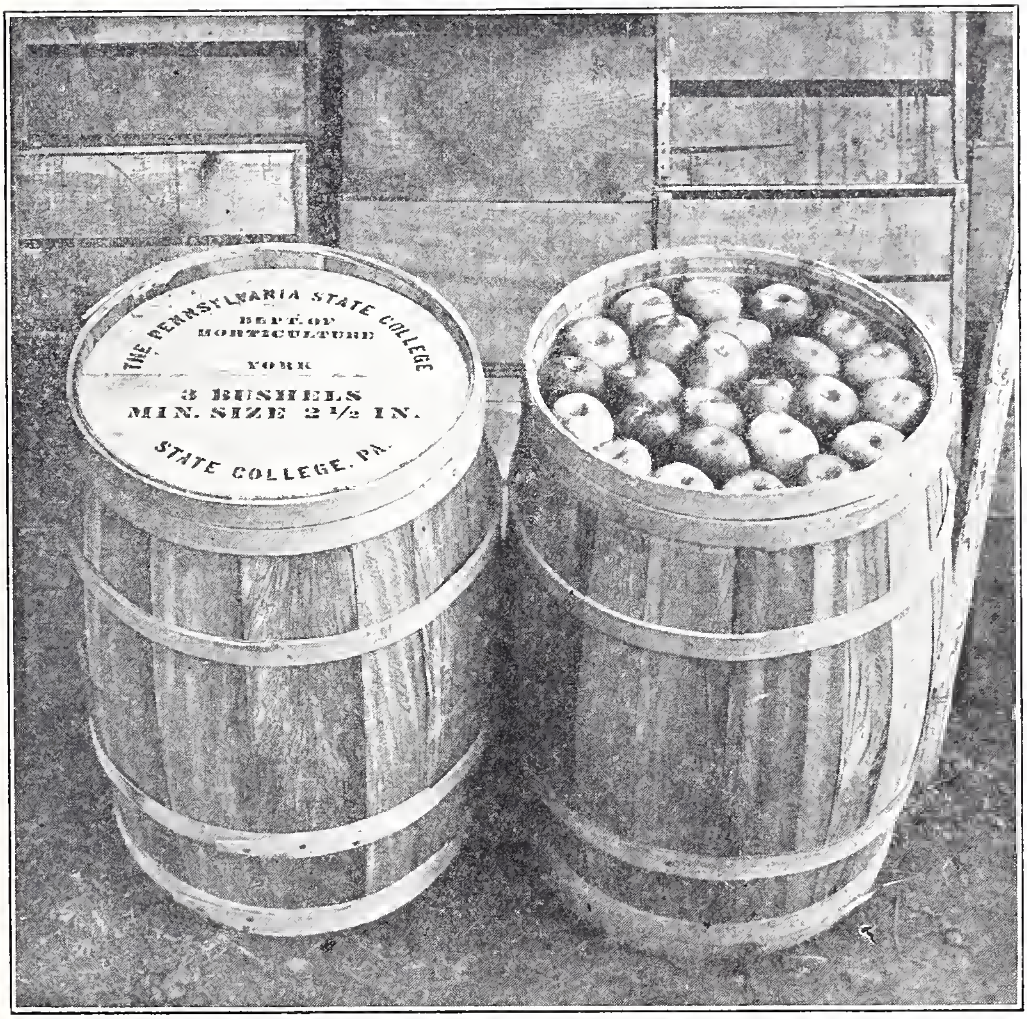
[1] Huckster is a modern corruption of the old English "hawkster," or one who "hawked" or "called out" his wares. Now accepted as one who sells from a wagon or cart on the streets.

Practically all the better-grade apples grown in the Cumberland Valley district are packed and practically none is shipped in bulk. The barrel is the most widely-used package but during the season of 1920 the covered bushel basket came into use. Undoubtedly the main reason for the growing popularity of the bushel basket was the high and in some cases, prohibitive cost of barrels; also improved methods of loading baskets for transportation and in the storage are bringing this type of package into more prominence in the commercial packing-house. Bushel hampers are used in a few instances but chiefly are confined to use for summer and early fall varieties of apples. One type of these hampers is packed similarly to barrels, that is, the cover is fastened, bottom removed, the package faced and filled and then the bottom piece pressed into place and nailed. The pressure is not against the apples toward the center, but is outward, following the spreading or diverging sides of the package. Box-packing in this section is practiced only to a small degree. The canneries and one or two evaporating plants form outlets for the culls from the various packing-houses; sometimes a man's entire ungraded crop is sold to the canneries direct from the orchard. This, however, is an unusual method.

There is no State law relative to apple grades at present and its absence is apparent. The idea of one grower as to what constitutes a barrel of "A-Grade" fruit is naturally different from that of another. While this lack of uniformity is not so conspicuous in the output of a single community, it is readily noticeable in the comparison of packs from each of the several counties in the Cumberland Valley district. Generally speaking, the grading in Franklin is even less uniform than in Adams. There are some growers who still insist on including a quantity of apples infested with scab or sooty blotch in a pack labeled "A-Grade." As a matter of fact, the promiscuous use of "Choice," "Fancy," and "Extra Fancy" has been a big factor in causing grading terms to mean little or nothing.

Facing in some cases is carried to an extreme. Generally, the custom is to double-face, or to single-face and spot. Facing in itself, is a temptation to place the choicest specimens on the face, thus misrepresenting the rest of the pack. In many States this is contrary to law! A lack of uniformity in grading, coupled with the variability in facing, clearly demonstrates the need of a well-enforced State Grading Law.



APPLES PACKED AND LABELED UNDER THE PENNSYLVANIA LAW.

The Pennsylvania Apple Packing Law[1] now being enforced, requires each package of apples packed in Pennsylvania to have branded in some conspicuous place; (1) the name and address of the packer, (2) the true name of the variety, (3) the minimum size (if box—the numerical count), and (4) the capacity in terms of dry measure. Another requirement is that the face or exposed surface shall fairly represent the average of the apples in the package.

This law does not include any requirements for grade, as do some other State laws. Some tentative grades recently have been drawn up, using the United States proposed grades as a basis, and at the present time a number of representative Pennsylvania growers are using and developing them. Color requirement features largely as a requisite in these grades.

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[1] A copy of this law will be found in the appendix.

The more important shipping stations in the Southern Region are:

Adams County: Bendersville, Biglersville, Gardners, Gettysburg, Guernsey, and Orrtanna.

Cumberland County: Boiling Springs, Bowmansdale, Longsdorf, Peach Glen, and Shippensburg.

Franklin County: Chambersburg, Conboy, Greencastle, Fayetteville, Midvale, Mont Alto, Quincy, Scotland, and Waynesboro.

York County: Hanover, New Park, Sheffer, Stewartstown, Wiley and York.

State roads are being improved and will facilitate transportation by truck and new roads are being constructed. Concrete and macadam highways radiate from Gettysburg to York, Frederick, Baltimore, Chambersburg and Harrisburg. In Franklin County also there is a good road from Chambersburg and towns further south through Shippensburg and Carlisle to Harrisburg and other good roads that connect with this main highway.

The markets that receive fruit from the Cumberland Valley section are numerous and distant. Shipments may be consigned to nearby Pennsylvania points, or, as during the past season of 1920-21, much stock may go to the numerous southern markets. Recently quite an extensive export trade has been developed in this section and the fruit from a first and early picking is packed and shipped to some foreign market, usually Liverpool, England. In this early picking, the more mature fruit is packed and the bulk of the crop remaining is taken at the second or main picking. This later picking forms the chief part of the crop that is packed and sent to the markets of this country.

In the Cumberland Valley district sixteen commercial storage houses are located, some entirely and some partly utilized for the storage of apples. A number of farm-storages which are used for apples also are located here. The total capacity represented by both farm and commercial storages, however, is insufficient at times to meet the demand for storage space. As a result, some growers lease space in storage houses at other centers, such as Baltimore, Harrisburg and Philadelphia.

Table 42. MARKETING METHODS USED IN DIFFERENT REGIONS

NUMBER OF GROWERS USING DIFFERENT METHODS.

Counties	Commercial								Semi-Commercial			Retail			
	On contract before picking.	F. O. B. local shipper	F. O. B. to receiver	Commission sale	Carlot broker	Through association	Cannery and drier	Through syndicate	To wholesaler	To truck jobber	On wholesale market	To retailers	On retail market	To consumers at farm	Huckstered
Northeastern Region															
Columbia,												14	10	2	2
Lackawanna,									6		2	13	7	3	5
Luzerne,	1	2		1					5	1	7	47	16	8	29
Total,	1	2		1					11	1	9	74	33	13	36
Southeastern Region															
Berks,				2					1			2	3	1	
Bucks,									2		1	3	1	1	1
Chester,		2		3					2			5	5	4	
Delaware,				1								1	1	1	1
Lancaster,													6	2	
Lebanon,									2			1	9	2	1
Montgomery,				3	1							5	2	4	
Total,		2		9	1				7		1	17	27	15	3
Southern Region															
Adams,	31	36	1	28	1	6	27	6	12	1	2	7	1		1
Cumberland,	8	7	1	1					7			1	6	2	1
Franklin,	25	16	12	19	3	2			4	1		2		1	1
York,	6	6		2					11	4	3	8	17	5	3
Total,	70	65	14	50	4	8	27	6	34	6	5	18	23	8	6
Western Region															
Allegheny,									1		1	2	4	3	2
Armstrong,													5		2
Beaver,												9	4		8
Butler,												4	1	2	
Crawford,											1		2	1	
Erie,				7					2		1	2	1		2
Lawrence,												15	3	2	5
Westmoreland,												1	1		2
Total,				7					3		3	33	21	8	21
Central Region															
Bedford,	3	5	3	2					4	6	1	13			2
Blair,			1	1					1			4	1	2	
Total,	3	5	4	3					5	6	1	17	1	2	2

Adams County. The counties differ somewhat from each other. In Adams County a large percentage of the crop works through the fifteen packing houses in the county. Many of the smaller growers—those whose acreage is not large enough to justify a special packing-house—dispose of their fruit to the large growers who have the machines and labor to put up good packs in the least amount of time, in other words, to growers whose machines and experienced labor cut down the overhead in the cost of packing.

Several large canneries and one or two evaporators form the necessary outlet for the culls from the various packing-houses. During years when apples bring fair prices, large quantities are shipped in from surrounding counties to these canneries.

Cumberland County is classed as one of Pennsylvania's commercial counties. Over half the number of growers sell their crop on some strictly commercial basis, chiefly on contract before picking, and F.O.B. to some local shipper. At the present time there are six special packing-houses scattered over the county, where much of the barreled stock is packed. A few other growers sell to wholesalers in the local communities and the rest of them put their fruit on the retail market, particularly in Harrisburg and Mechanicsburg.

Franklin County rivals Adams for supremacy in the commercial apple industry in Pennsylvania. Of the sixty-five growers recorded in the survey, fifty-six sell their apples on a commercial basis, on commission, on contract before picking and F.O.B. to local shippers. The fourteen packing-houses in the county form an important factor in the packing and distribution of the crop. Five of the growers visited dispose of their crop to local wholesalers and truck jobbers; the remaining four growers sell their apples to retailers in Chambersburg, and huckster them in that center.

Greater development of the industry in this county will be facilitated by more efficient methods for disposing of the seconds and culls from the packing-house. Growers would materially benefit by having canneries and other by-product plants, instead of packing this inferior fruit for the market, letting it go to waste or shipping or hauling it to some distant cannery. During the past year Franklin already has surpassed Adams County in carlot shipments, reaching above the one thousand mark.

York County. The commercial end of the apple industry in York County is rapidly growing. The local consuming centers are able to take but a small part of the present supply, and a large part of the crop each year goes through five special packing-houses in the county, where it is packed in barrels and bushel baskets, and shipped chiefly from Felton, Hanover, Hanover Junction, New Park, Stewartstown, Wiley and York. A considerable part of the crop of the county is sold to grocers or on the nearby local markets.

MARKETING IN OTHER SECTIONS OF PENNSYLVANIA.

THE SOUTHEASTERN REGION.

There is not much grading and packing of the apples grown in this region. The newer and younger orchards are run on a commercial scale, but only a small proportion of the fruit is packed in barrels and bushel baskets. For retail purposes an attempt at grading usually is made by culling out the worst of the fruit after which the remainder is put in open 16 quart and 5/8 bushel baskets or bushel crates.

This is a good retail section, because of the many large cities and towns and a large part of the apple crop is disposed of locally. Chief among the methods employed are selling to consumers at the retail markets, and to retailers. The cities in which the demand is at least partly supplied by local fruit are Allentown, Bethlehem, Easton, Reading, Norristown, Lancaster, Lebanon, Harrisburg and York. Apples sold to retailers and to consumers in large quantities are packed in Delaware and bushel baskets or in crates. While huckstering and selling to consumers in the orchard are methods used to a considerable extent, they do not predominate in this region.

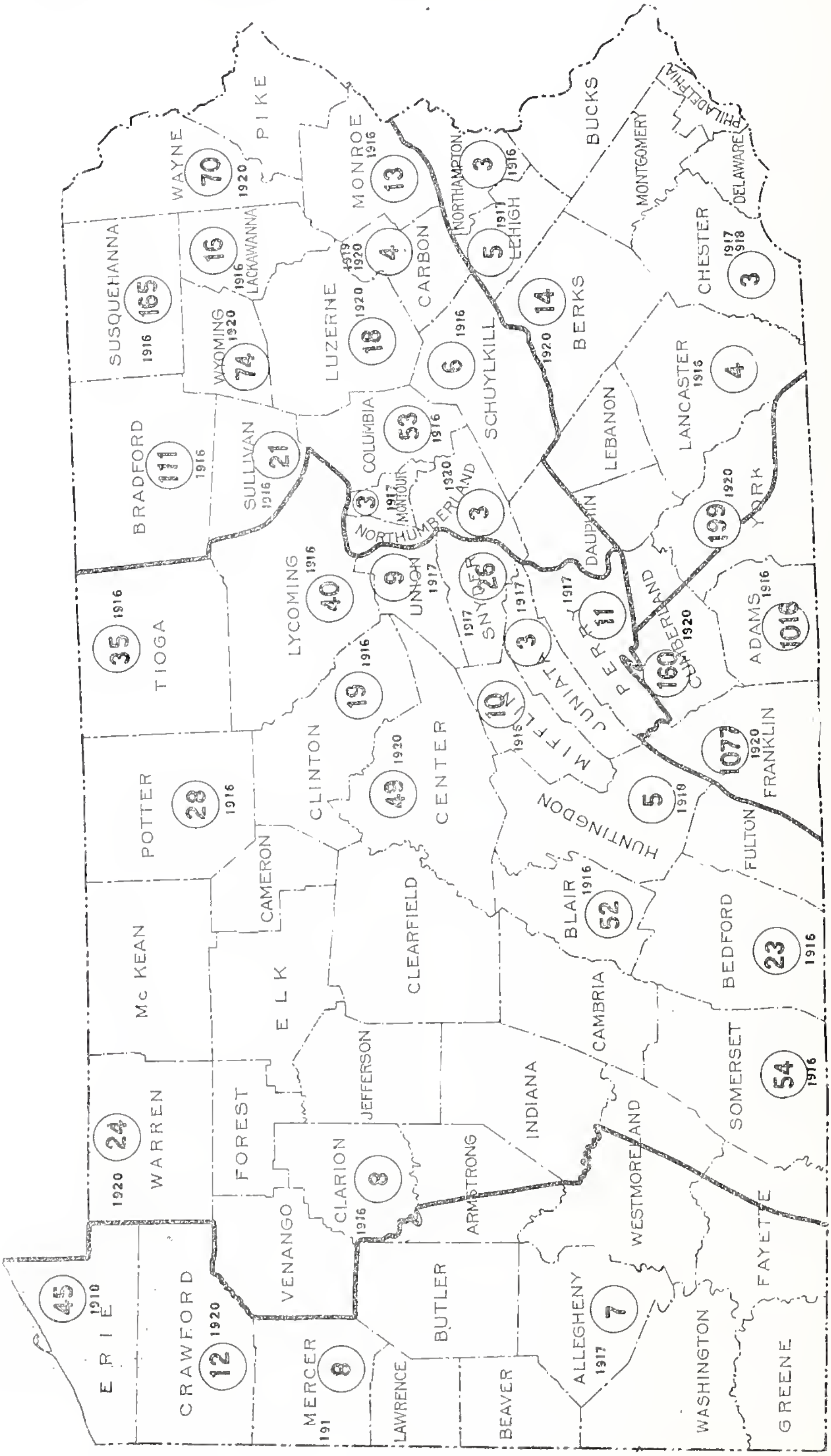
A smaller quantity is sold to wholesale dealers in the various towns and a few growers barrel their apples. During the 1920 season only 16 cars were shipped from this region.

Motor-truck transportation is coming into greater prominence, especially so in the counties surrounding Philadelphia. Short hauls to this city over moderately good roads deliver a portion of the crop into the store-houses of the city wholesale dealers and commission men. Thus there is a larger wholesale trade in the counties near Philadelphia than in the remaining counties of the region which are classed as strictly retail.

In the previous discussion of the characteristics of the Southeasern Region attention was called to the extent to which the splendid local markets have modified the fruit industry of this region. Table 42 shows how large a proportion of the growers dispose of their fruit in a retail way. Chart XX shows the counties of the State wherein apple shipments since 1916 have totaled more than five cars and in addition notes the year in which the heaviest shipment was made together with the number of cars that year. This chart again serves to emphasize the fact that the Southeastern Region is a local-market region.

CHART XX:—CAR LOT SHIPMENTS OF APPLES.

Counties whose total shipment of apples for the years 1916-1920 included has been more than 5 cars and the largest number shipped in any of these years and the years shipped.



The development of good roads has had another important effect upon marketing in this and other local-market regions besides making it easier to truck the fruit to market. Growers soon found that many of the auto parties passing on these good roads were anxious to buy fruit and that a roadside stand in connection with the orchard could dispose of a considerable part of the crop. Some large orchards now sell nearly all the fruit to auto parties who coming direct to the packing-house, see the fruit packed and carry it away with them.

The conditions that led to the developing of local marketing are so general throughout the State that, except in the Southern Region, we may say the majority of the growers sell their crop (1) to retailers, (2) directly to consumers at the farm, (3) at the retail market, or (4) by huckstering, thus supplying many of the consuming centers of the State by nearly direct sales. But in practically every one of these consuming centers can be found the western boxed apples, not only on display, but selling, because in many cases they are the apples which are available to meet the demand for clean, well-graded fruit.

The proportion of Pennsylvania's population living in cities and towns as compared with that of other States where local market methods of selling fruit are in use is interesting. Massachusetts, where the roadside market has long been in use, has, according to the fourteenth Census, nearly 95 per cent of her population living in cities and towns. New York's 82 per cent is due so much to New York City that the comparison is not just. In the Hudson Valley in New York State, where the concentration of population is greatest, much of the fruit is sold locally. Western New York, however, where the greatest fruit belt is located, is distinctly a rural region and the fruit is sold in carlots. There is hardly a city or town in New York State that possesses a local market of the type so commonly found in southern and eastern Pennsylvania. The absence of these markets in New York has served to discourage the direct selling of the fruit. New Jersey's urban population is nearly 79 per cent of her total; this, with the small size of the State and the numerous good roads, makes it easy for New Jersey growers to dispose of their fruit locally. Pennsylvania has only a little over 64 per cent of her people living in cities and towns of over 2500 inhabitants but the total number of these is greater than the total number of Massachusetts' urban population and as has been shown by Chart XII there are several regions of the State where the city population is concentrated and these are the regions where our local-market orchards are found.

Towns of less than 2500 inhabitants are reported by the census as part of the rural population of the State, but one who is familiar with the large number of mining and manufacturing towns of this size in Pennsylvania knows how far these places are from being rural and what good markets they afford for the second quality fruit of the surrounding region.

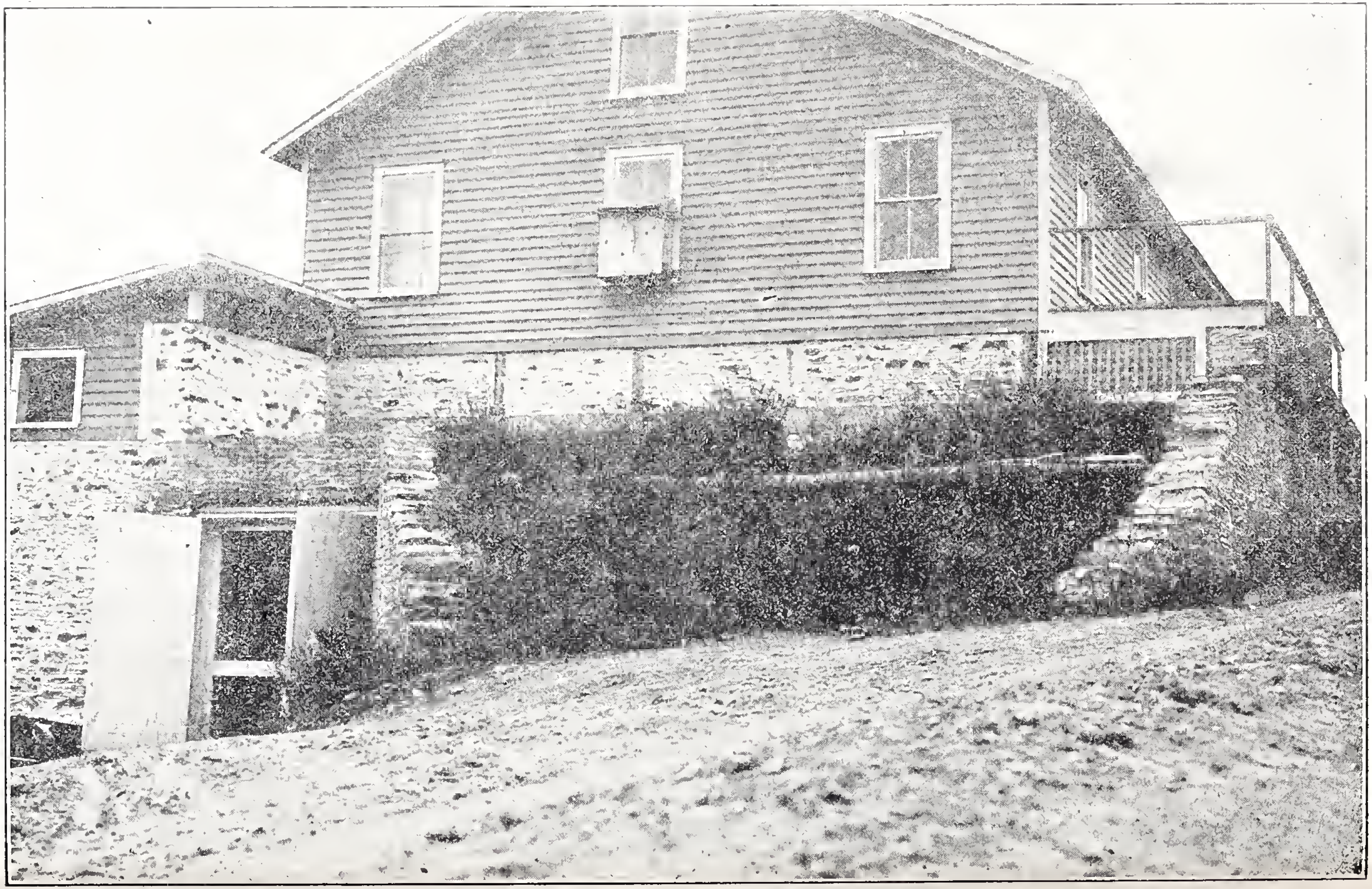
Both truck and rail transportation are used by growers in the various sections of this State, depending, of course, upon the distance to destination. Where packing is done, the barrel and the bushel basket are used, the latter in greater proportion in the rest of the State than is found in the Cumberland Valley district. But many of the cars shipped are bulk stock to be disposed of in large consuming or distributing centers.

THE NORTHEASTERN REGION.

Regardless of the fact that this is quite an apple-producing region, grading and packing of the fruit is but little done. A retail trade has been developed which accepts fruit that has only the smallest and the most diseased apples culled out; often the "orchard run" grade is just put in Delaware and bushel baskets and sold on the market. In a few of the larger commercial orchards the fruit is graded and barreled and in one or two cases boxed. This is shipped out by mail and express to the larger markets. While there is not much retailing in the northern tier of counties, it exists to a large extent further south to meet the demand particularly in Scranton, Wilkes-Barre, Pittston, Hazleton, Berwick, Danville and Sunbury. Wholesale dealers and local, f.o.b. shippers in these and various other towns receive a small proportion of the crop which is later distributed to different stores or shipped in bulk to some other consuming center, but the main carlot shipping area is situated along the northern boundary. During 1920, a total of 324 cars of apples was shipped out of this region, of which 75 per cent originated in the four counties of Bradford, Susquehanna, Wayne and Wyoming. Of the total, a large proportion was undoubtedly bulk shipment.

Trucks are being used more and more for hauling fruit to the various markets. Road improvements and new construction are important factors in marketing. The Pennsylvania, Lehigh Valley and D. L. & W., railroads and their branches cover many points in this region and enable the commercial growers to get their crops on the large markets in carlot quantities.

Three or four commercial by-product plants manufacturing cider and vinegar are found, mostly in Luzerne County where there also is a cannery using some apples. One large apple-butter plant also is located in Bradford which is an outlet for the seconds from the packing-house. Apple-butter is made at the majority of orchards for home consumption and some for retail sales. The custom cider manufactured extensively throughout the region is intended entirely



for home use and is not sold. So, while the quantities of apples going into commercial by-products are small in comparison with the average apple crop produced, a large amount of fruit is used in the manufacture of by-product for home consumption.

About 80 farm storages with an aggregate capacity of nearly 150,000 bushels were visited on the survey in this section. These are found mostly in the "retailing" counties of Columbia, Lackawanna and Luzerne and these, it can be seen, are a very important factor in retail marketing. Many of them are cellar storages, holding the fruit for sale throughout the winter, to retail stores or directly to consumers.

THE CENTRAL REGION.

Retailing is carried on to quite an extent in this region and such towns as Greensburg, Johnstown, Altoona, Lewistown, Williamsport and many others are supplied partly throughout the winter with local fruit. However, in all these centers not only New York and West Virginia barreled stock can be found in large quantities but also western boxed apples that are obtained chiefly through Pittsburgh.

Bedford and Somerset counties produce a large quantity of apples and practically all shipments made from these counties are in bulk lots to Pittsburgh. During 1920 these two counties alone shipped 156 cars of a total of 346 from the Central Region. Blair, Centre and Lycoming counties, which appear to be changing to more of a commercial basis, shipped 100 cars last year. The northern tier of counties in this region shipped 60 cars during the year. The remaining 30 cars originated from scattered points. The chief railroads over which transportation can be had are the Pennsylvania, the New York Central, the Baltimore and Ohio, the Central of Pennsylvania and the Huntingdon and Broad Top.

In Blair and Bedford counties alone, 19 farm storages with a total capacity of at least 35,000 bushels were visited on the survey. Most of these are in Bedford, where apples are picked and put in these farm storages and shipped from time to time in bulk, chiefly to Pittsburgh, or, when in smaller lots, trucked to nearby local markets.

THE WESTERN REGION.

Practically no packing and very little grading are done throughout this region except in Erie County. Most of the fruit is sold locally and the only requirement seems to be a sorting out of the poorer apples and putting the remainder in Delaware or bushel baskets or slat crates. One or two growers pack for local markets in sugar and flour barrels, but these containers are not headed.

Nearly all the growers in the counties south of Crawford retail their fruit in the numerous cities and oil-towns. Several growers near Pittsburgh sell their crop to wholesale dealers but all the others sell to retail stores and to consumers at retail markets or by huckstering. The larger towns and the ones which present the greater demand, are Butler, Beaver, Beaver Falls, Sharon, Mercer, New Castle and Uniontown. A great amount of New York, West Virginia barreled stock can be found throughout the winter in the whole region. This, of course, usually comes from Pittsburgh as a distributing point.

During 1920, a total of 34 cars was shipped out of this region, all from Erie and Crawford counties. The main railroads over which approximately 175 cars have been shipped during the last five years are the Pennsylvania, the Baltimore and Ohio, the Pittsburgh and Lake Erie, the Buffalo, Rochester and Pittsburgh and the New York Central.

Commercial by-product plants are located chiefly in Pittsburgh and Erie. A number of growers in Erie County are recorded as selling practically their entire crop for the manufacture of cider.

Hardly as many good farm storages are found in this region as one would expect from the nature of the marketing. Whatever fruit is stored usually is put in bins in the cellar. Owners of some of the younger and larger orchards now are building special storage places.

CARLOT SHIPMENTS.

The heaviest carlot movement during the last five years was in 1920, with 1916 a very close second. The remaining three years the number of cars shipped was fairly steady, averaging about 1500. A five-year table, giving total shipments by calendar years, is shown below:

Total Carlot Shipments of Apples for Five Years, 1916-1920.

Year	Cars.
1916	2554
1917	1518
1918	1340
1919	1626
1920	2883
Total	10,921

Reference to the Appendix shows the distribution of the counties making these shipments.

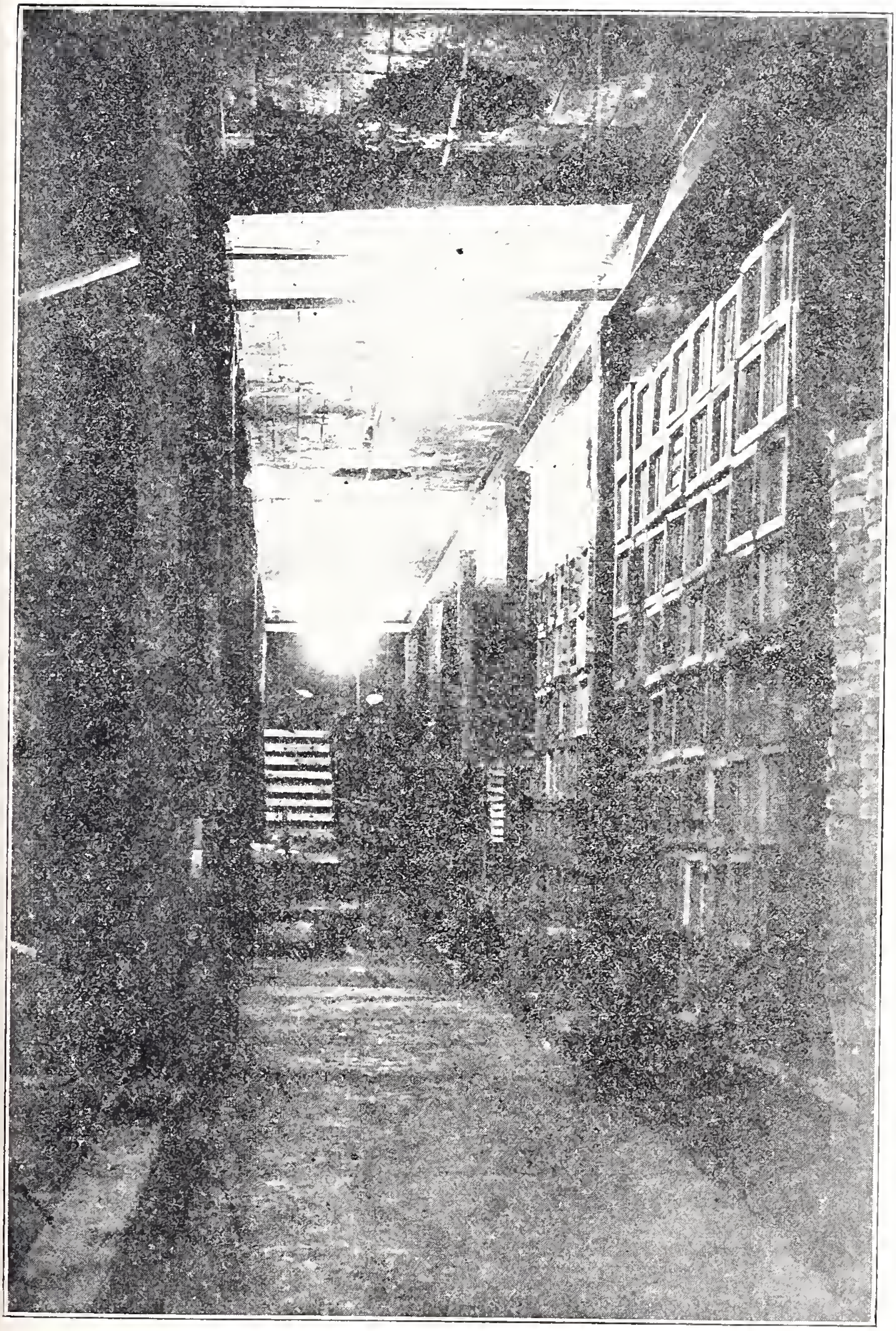
PERIOD OF MARKETING.

In Adams County practically all the fruit has left the farm by the first of December and in Franklin and Cumberland counties it is moved out two or three weeks earlier. In York County some growers dispose of their crop on nearby markets and so carry it over into January and February but the bulk of the movement is in October. Bedford is gradually joining the ranks of the "local-market" orchards and while the bulk of the crop is still moved in October a considerable quantity is carried over and disposed of throughout the winter. In the main local-market counties such as Luzerne, Berks, Montgomery, Bucks, Allegheny and Beaver, there is a steady movement to market from the first harvest until well into February and the growers with better storage facilities continue to market with added advantage until spring.

FRUIT STORAGE.

Only a very small part of the barreled crop is stored on or near the farm. It is shipped to the larger storage houses either in the large market centers or at such convenient shipping points as Chambersburg, Cumberland and Hagerstown. This condition is reversed entirely in the local-market regions. Here the growers wish to distribute their marketing over as long a period as possible and to keep a fairly constant supply on their particular market. The orchards are sufficiently near consuming centers to insure fruit being hauled from the farm at any time during the winter without danger of freezing. From these facts we see that it is very desirable and remunerative to store a considerable quantity of fruit on the farm for periods of from one to five months and it is rarely that the local-market grower does not have storage space for at least 500 bushels of apples.

More than one-half of these storage spaces are house cellars. The old-fashioned, farm-house cellar with its dirt floor and the absence of a furnace affords very satisfactory apple storage, although frequently the temperatures are not as low as desirable. House cellars always will be used as storage places on the smaller farms until the introduction of the furnace destroys their usefulness for such purposes. On a number of farms a room in a basement, barn or the cellar under some shed is used. When it is well-planned, the storage space in the basement of the barn is quite satisfactory, as the barn floor can then be used for sorting and packing the fruit for market. The larger growers soon find it necessary to build special storage houses to accommodate their business. Fifty-eight of such storage houses were inspected during the survey, one-half of which were



INTERIOR OF A BANK STORAGE.

bank storages. This has proved the most satisfactory type for the local-market grower. The ground temperature rises very slowly through the summer and drops nearly as slowly during winter, thus cellars that are built into a hillside are cooled in the fall and warmed in the winter. It is the cheapest type of permanent construction since no insulation is needed except where the house is above the ground. A few growers have been located so fortunately that they could build their storage with spring water running through it. This aids in cooling the storage in the spring and fall and by maintaining humidity, prevents the drying and shrivelling of fruit.

Of the storages built entirely above ground, about one-third were of concrete construction. This type is satisfactory when the insulation is well planned but it is not as easy to maintain uniform temperatures. A number of wooden storages still may be found but they are mainly of the older types and gradually are being replaced by bank storages. Because of the high price of lumber and the shorter life of such storages it would hardly seem worth while to use this material at present.

A larger increase in the amount of storage space available for apples in this State must be provided for the immediate future. The orchards from which fruit now is going into storage are increasing their production and large areas will be coming into production in the next five years. The handling of this constantly-increasing crop presents many difficulties and without adequate storage space some of the growers are certain to meet disaster. In the State at present are many stoarges with refrigerating facilities but only about 15 per cent of the total space is used for fruit and vegetables. Either a larger proportion of this space must be made available or new storages built. If the Southern Region follows the history of its older competing area on the north, the western New York fruit-belt, these storages will be built at the shipping point. It is to be hoped that, if this is the case, the storages shall be more or less cooperative to be operated in conjunction with community packing-houses possibly with by-products plants for the utilization of low-grade apples.

COST OF GROWING APPLES.

Only a few growers were able to give an estimate of what it had cost them to grow, pick and pack a bushel or a barrel of apples; exclusive of the package. The average estimate of the cost in Adams County before the war was $1.43 per barrel while in Franklin and Cumberland it was $1.76 and $1.95 respectively. The estimate of the cost in 1919 and 1920 for Adams County was $3.72, for Franklin, $3.79 and for Cumberland, $3.00. The best estimates of the local-market regions were secured in Luzerne County. Here the cost per bushel before the war was placed at $0.88 on the average and the cost in 1919 and 1920, at $1.06.

When these costs are placed on a bushel basis it would seem that before the war the men in the Southern Region could get a bushel of apples ready to go in the barrel somewhat cheaper than the Luzerne County growers but when labor costs went up, the Southern Region with its large crews of hired help could no longer produce its apples any cheaper than the man in the Northeastern Region who himself did much of the labor on the farm. This shows how important the feature of labor charge intervenes in the cost of producing apples.

APPENDIX.

PRODUCTION OF APPLES IN PENNSYLVANIA BY COUNTIES, 1919.

County	Trees not of Bearing Age	Trees of Bearing Age	Production Bushels
STATE TOTAL	2,628,053	6,988,594	5,512,795
Adams	280,355	254,228	742,196
Allegheny	57,079	151,246	69,998
Armstrong	28,035	118.664	40,161
Beaver	54,679	102,095	67,670
Bedford	59,893	279,283	152,314
Berks	96,869	181,309	254,453
Blair	28,528	114,110	37,230
Bradford	34,198	136,858	68,675
Bucks	65,844	120,980	152,404
Butler	44,015	165,238	30,871
Cambria	25,682	99,536	11,192
Cameron	2,703	6,712	1,289
Carbon	21,067	42,178	42,047
Center	22,397	77,954	47,724
Chester	67,421	122,331	148,574
Clarion	25,627	88,699	5,611
Clearfield	18,869	118,394	15,338
Clinton	8,100	37,322	13,898
Columbia	37,882	96,624	83,327
Crawford	19,434	198,025	56,795
Cumberland	77,271	106,791	167,083
Dauphin	48,501	91,799	61,689
Delaware	17,814	23,854	32,527
Elk	4,502	26,344	5,486
Erie	46,679	171,757	119,838
Fayette	20,336	100,896	32,991
Forest	2,639	15,576	771
Franklin	101,424	239,011	468,205
Fulton	15,026	92,080	83,799
Greene	27,552	134,288	49,921
Huntingdon	35,998	88,687	53,841
Indiana	34,098	130,910	36,037
Jefferson	25,104	113,934	10,006
Juniata	12,094	42,884	62,515
Lackawanna	39,356	101,420	38,611
Lancaster	98,191	124,431	169,244
Lawrence	32,590	74,743	38,470
Lebanon	26,892	54,695	67,257
Lehigh	39,722	67,400	120,867
Luzerne	90,829	165,133	121,316
Lycoming	33,397	111.289	76,267

County	Trees not of Bearing Age	Trees of Bearing Age	Production Bushels
McKean	6,708	49,101	22,601
Mercer	29,714	141,841	73,402
Mifflin	13,344	30,305	43,805
Monroe	19,301	59,175	48,304
Montgomery	65,187	98,365	90,640
Montour	12,099	19,727	8,405
Northampton	25,586	64,178	81,706
Northumberland	36,208	101,106	70,785
Perry	34,612	68,046	88,433
Philadelphia	1,932	2,369	4,940
Pike	4,529	23,831	18,569
Potter	7,163	83,131	52,666
Schuylkill	54,903	125,828	123,443
Snyder	29,920	51,742	84,488
Somerset	39,542	159,041	17,566
Sullivan	14,049	33,998	24,391
Susquehanna	26,702	158,674	42,904
Tioga	10,161	122,762	103,471
Union	10,725	37,817	39,914
Venango	13,531	88,499	6,113
Warren	3,954	99,271	10,118
Washington	46,970	129,212	77,579
Wayne	35,336	178,596	77,598
Westmoreland	51,638	157,295	65,456
Wyoming	63,609	80,450	66,179
York	141,938	234,526	310,811

RECORD OF CARLOT SHIPMENTS OF APPLES

1916 to 1920 (inclusive).

THE SOUTHERN REGION.

Below is a table showing the carlot shipments of apples from the Southern Region. This table includes York County, as that section from which most of the apples are shipped in cars belongs in this Region. It can be readily noticed that the heaviest shipment was during the calendar year of 1916; in fact, a few of the shipping stations named under the 1916 column, have reported no shipments since that time.

ADAMS COUNTY

	1916	1917	1918	1919	1920
Bendersville	96	99	95	63	83
Biglerville	576	279	150	306	292
Fairfield	12	10		4	36
Gardners	46			16	63
Gettysburg				73	149
Guernsey	127			67	79
Guldens	6				
Jack's Mountain	7				
McKnightstown	30				
New Oxford	4	4		3	7
Orrtanna	112	70		2	3
	1016	462	245	534	712

CUMBERLAND COUNTY

	1916	1917	1918	1919	1920
Boiling Springs	15	12	12	10	
Bowmansdale	22	37	7	21	
Carlisle		2		3	
Gettysburg Junction				1	4
Greason	9	12		6	5
Greythorne	1	2			
Hays Grove	8				11
Hunters Run	19	18	10		13
Lees Cross Roads	4	5		3	3
Longsdorf	35	31		21	32
Mechanicsburg				4	
Newville	8	21	22	15	2
Oakville				1	
Peach Glen			30	11	26
Shippensburg	7	11	2	71	74
Shiremanstown		1			
Starners	32	14	3		5
	160	166	66	167	175

FRANKLIN COUNTY

	1916	1917	1918	1919	1920
Chambersburg	166	46	26	47	89
Conboy	18				38
East Fayetteville	55				
Fayetteville		29	47	70	120
Fort Louden	51			2	1
Geiser	4	5	3		
Greencastle	7	1	57	13	75
Guilford				17	
Kauffmans			18	28	30
Lehmasters	74	56	47	65	55
Marion	41	13	34	23	50
Mason Dixon	49	5		11	19
Mercersburg	14	1		4	1
Midvale	1	5	6	51	102
Mont Alto	71	56	124	51	108
Quincy	127	58	92	131	135
Richmond	29	17	22	15	24
Scotland	84	30	63	59	72
Waynecastle	48			2	3
Waynesboro	14	19	22	50	155
Williamson	62				
	895	351	561	639	1077

YORK COUNTY

	1916	1917	1918	1919	1920
Brodbecks					5
Brogueville	1	1		1	
Dallastown		1			
Dillsburg	3	5			
Emigsville	2		4	2	
Fawn Grove		1			2
Felton	5	1		1	9
Hanover	1	5	6	6	14
Hanover Junction	1	3	2	5	13
Highrock				4	1
Laurel	2				
Muddy Creek Forks		1			
New Freedom		1	2		3
New Park	16		9		29
Red Lion				1	
Sheffer	10	1			2
Spring Grove					1
Stewartstown	25	10	22	1	45
Turnpike	15				
Wiley	39	20	34	31	59
Wrightsville		1			
York	1	2		10	16
	121	53	79	62	199

THE SOUTHEASTERN REGION.

Table shown below gives the shipments for five years from the various shipping stations in the Southeastern Region:

	1916	1917	1918	1919	1920
BERKS COUNTY					
Boyertown	9				
Geigertown			1		
Hamburg				2	11
Leesport					1
Lorane					1
Vinemont					1
	9		1	2	14
BUCKS COUNTY					
Doylestown				2	
Lahaska				1	
Trevose			1		
			1	3	
CHESTER COUNTY					
Spring City		3	3	1	
		3	3	1	
LANCASTER COUNTY					
Elizabethtown	1				
Lancaster	3				1
Peach Bottom			3		
	4		3		1
LEHIGH COUNTY					
Germansville		5	2	3	
Hosensack	3				
	3	5	2	3	
NORTHAMPTON COUNTY					
Danielsville	1	1			
Portland	2	1	1		
	3	2	1		

THE NORTHEASTERN REGION.

BRADFORD COUNTY

	1916	1917	1918	1919	1920
Alba	4	4		1	2
Athens					1
Canton	17	4	10	12	13
Columbia Cross Roads	2	2		1	2
Cowley	2	1			5
Gillett	4	2			
Grover	4	2		1	
Milan	2				
New Albany	42	32	20	7	23
Powell					2
Standing Stone	2	1			3
Towanda	3	2			
Troy	9	7	1	3	4
Ulster					1
Wilawna	1				
Wyalusing	15				
Wysox	4				
	111	57	31	25	56

CARBON COUNTY

	1916	1917	1918	1919	1920
Lehigh Gap		1		2	
Lehighton			3	2	4
		1	3	4	4

COLUMBIA COUNTY

	1916	1917	1918	1919	1920
Benton	52	43		4	21
Berwick	1	1			
Catawissa		2			2
Creasy					1
Mainville		1			8
Milleville			1		
	53	47	1	4	32

DAUPHIN COUNTY

	1916	1917	1918	1919	1920
Halifax				1	
Millersburg		1			1
Steelton		1			
		2		1	1

LACKAWANNA COUNTY

	1916	1917	1918	1919	1920
Carbondale	5	4			
Clarks Summit					3
LaPlume	5	4			
Moscow	2				
Scranton	4				
	16	8			3

LUZERNE COUNTY

	1916	1917	1918	1919	1920
Dallas	2		2		4
Hemlock Creek		5			14
Pittston		1			
Shickshinny	6				
	8	6	2		18

MONROE COUNTY

	1916	1917	1918	1919	1920
Analomink	1		1		2
Cresco	7	3			
Mount Pocono					1
Saylorsburg	3		1	2	3
Tabyhanna	2				
	13	3	2	2	6

MONTOUR COUNTY

	1916	1917	1918	1919	1920
Danville		1			
Mooresburg	2	2	1		1
	2	3	1		1

NORTHUMBERLAND COUNTY

	1916	1917	1918	1919	1920
Dalmatia				1	
Dernsife					1
Northumberland		1			
Selinsgrove Junction		1			
Snydertown			1		
South Danville					2
		2	1	1	3

PIKE COUNTY

	1916	1917	1918	1919	1920
Mast Hope	1				
	1				

SCHUYLKILL COUNTY

	1916	1917	1918	1919	1920
Andreas				2	
Ferndale	3				
Good Spring	3				3
Gordon					1
Millers			3		
Orwigsburg			1	1	
	6		4	3	4

SULLIVAN COUNTY

	1916	1917	1918	1919	1920
Dushore	21	10	14		8
	21	10	14		8

SUSQUEHANNA COUNTY

Alford	12		1		8
Foster	28	4	7		
Kingsley	25	16	16	3	8
Montrose	14	6	26	1	12
New Milford	54	9			7
South Montrose	17	3			6
Springville	8	4			3
Starrucca	4				
Thompson	3	1	2	2	1
	165	43	52	6	45

WAYNE COUNTY

Gouldsboro		2	1		2
Gravity	4	5	2		8
Honesdale	34	10	51	5	41
Lake Ariel	15				
Lakewood	7	6		1	7
Maplewood	1	2			3
Pleasant Mount			2		
Poyntelle	1		2		
Preston Park		1			4
Starlight	1	1			
Waymart	1				5
	64	25	58	6	70

WYOMING COUNTY

Factoryville		1			
Falls				10	16
Laceyville	6	4		10	7
Meshoppen	12	6		1	
Noxen	4	8	4	3	17
Tunkhannock	8	5			18
Vosburg	7	10	3	4	16
	37	34	7	28	74

CENTRAL REGION.

Carlot shipments are given below in detail, and show the number of cars originating from the various shipping points during the past five years:

BEDFORD COUNTY

	1916	1917	1918	1919	1920
Bedford	116	32	36	5	71
Buffalo Mills	20	9	7	7	9
Cessna	9	6			6
Claysburg					1
Fishertown	29	11	3	5	22
Fossilville	7				
Hyndman	2			1	
Imler	11				
Manns Choice	26	15	13	7	29
Osterburg					3
Queen	11	4			6
Reynoldsdale					1
	231	77	59	25	148

BLAIR COUNTY

	1916	1917	1918	1919	1920
Curry	24	1	12		10
Duncanville	1				
East Freedom	1				
Martinsburg	21	9	12		18
Ore Hill	2				5
Tyrone		1	2	1	1
Williamsburg	3				1
	52	11	26	1	35

CAMBRIA COUNTY

	1916	1917	1918	1919	1920
Bradley Junction					1
Patton					1
					2

CENTRE COUNTY

	1916	1917	1918	1919	1920
Bellefonte	8				5
Center Hall	3	6		1	10
Coburn	1				5
Hecla Park	6				
Lemont					14
Oak Hall	3		3		
Port Matilda	4				
Rising Springs	11	3	6		5
Sandy Ridge				5	10
Unionville	1	4		1	
	37	13	9	7	49

	1916	1917	1918	1919	1920
CLARION COUNTY					
Mayport	8				1
	8				1
CLEARFIELD COUNTY					
Dubois		1			
Kerrmoor	3				
Mahaffey				1	
	3	1		1	
CLINTON COUNTY					
Lamar	11				
Mill Hall	3				
Salona	5				
	19				
ELK COUNTY					
Johnsonburg	1				
	1				
HUNTINGDON COUNTY					
Pennsylvania Furnace	3		5		
Union Furnace	1				
	4		5		
INDIANA COUNTY					
Cherry Tree	2				
	2				
JEFFERSON COUNTY					
Big Run	1	1			
	1	1			
JUNIATA COUNTY					
Honey Grove	1				
Mifflin			2		
Thompsontown	1	3			
	2	3	2		
LYCOMING COUNTY					
Bodine	23	1			
Halls	1	2			
Jersey Shore	1	4			
Larry's Creek	1	1			
Roaring Branch	7	4	5		
Trout Run	6		3		16
Williamsport	1	1		2	
	40	13	8	2	16

MIFFLIN COUNTY

	1916	1917	1918	1919	1920
Belleville	10				
Lewistown		1			
McVeytown		1			
	10	2			
PERRY COUNTY					
Duncannon					2
Millerstown		3		2	
Newport	1	8	2	6	3
	1	11	2	8	5
POTTER COUNTY					
Coudersport	4	2	6	4	3
Galeton	6	3		1	
Genesee	5	6	5		4
Harrison Valley	1		2		7
Millport	1				1
Mills	7				
Oswayo	2				
Ulysses	2		2		1
	28	11	15	5	16
SNYDER COUNTY					
Beaver Springs	1	1			
McClure					1
Middleburg		1	4	7	7
Selinsgrove	4	24	1	5	11
	5	26	5	12	19
SOMERSET COUNTY					
Berlin	9	1			1
Boswell	11				
Friedens	10		1		
Glencoe	1				
Markletown	1				1
Somerset					2
Stoyestown	2				
West Salisbury	20				4
	54	1	1		8
TIOGA COUNTY					
Ansonia	5				
Arnot	2	3			1
Gaines Junction	9		6	1	1
Hoytville	11			1	7
Jackson Summit			1	1	1
Knoxville	8	1			
Lawrenceville	2		1		
Mansfield		1	5		3

	1916	1917	1918	1919	1920
Middlebury	10			4	
Millerton	9				
Nelson	1				1
Potter Brook	12				
Sabinsville	8		6		
Tioga	13			3	4
Tioga Junction	4	6			
Trowbridge	3				
Wellsboro	20	21		18	
Wellsboro Junction	10	1	2		1
Westfield	8	1			1
	135	34	21	28	20
UNION COUNTY					
Lewisburg		1			
Mifflinburg					1
Millmont		8			2
Vicksburg	1			1	
	1	9		1	3
VENANGO COUNTY					
Raymilton	1				
	1				
WARREN COUNTY					
Bear Lake					10
Lottsville	1				13
Russel					1
Youngsville			1		
	1		1		24

THE WESTERN REGION.

ALLEGHENY COUNTY

	1916	1917	1918	1919	1920
Allegheny	2	7			
Junction Transfer				1	
Pittsburgh	2				
	4	7		1	

	1916	1917	1918	1919	1920
ARMSTRONG COUNTY					
Craigsville	2				
Putneysville	1				
	3				
CRAWFORD COUNTY					
Centerville					4
Cochrantown			1		
Linesville			2		
Spartansburg	2				8
Titusville	1				
	3		3		12
ERIE COUNTY					
Corry	1		16	1	
East Waterford				1	
Girard	1				
Mill Village	3				
North East	16	3	12	42	17
Platea			1		
Springfield	2		4		3
Union City	2	1	7		2
Waterford	4		5		
	29	4	45	44	22
FAYETTE COUNTY					
Connellsville	3				
	3				
LAWRENCE COUNTY					
New Castle		2			
New Wilmington		1			
Wilmington Junction		1			
		4			
MERCER COUNTY					
Clarks Mills	1	1			
Fredonia	4	1			
Mercer	1	1			
Sandy Lake	1				
Stonebow		1			
West Middlesex	1				
	8	4			

RULES AND REGULATIONS

FOR THE

PACKING OF APPLES IN PENNSYLVANIA

Issued under the authority of Act of the General Assembly, approved May 24, 1917, and entitled, "An Act regulating the packing of apples, providing penalties for violation, and imposing certain duties upon the Department of Agriculture."

Any violations of this law and these regulations should be reported at once to the DIRECTOR, BUREAU OF MARKETS, DEPARTMENT OF AGRICULTURE, HARRISBURG, PA.

SUMMARY

These regulations require that any closed package of apples grown in Pennsylvania shall bear the following marks:

a. The name and address of the packer.

b. The true name of the variety.

c. The minimum size or the numerical count of the apples within the package.

d. The capacity in terms of dry measure.

REGULATION 1—DEFINITIONS

Section 1. Words in these regulations used in the singular form shall be deemed to import the plural, and vice versa, as the case may demand.

Section 2. For the purpose of these regulations, the following terms shall be construed, respectively, as follows:

A "closed package" shall mean a box, barrel or other package, which is covered or closed in such a manner that the package must be opened to permit inspection of contents.

"Packer" shall mean any person who produces and packs, or who packs or repacks, apples grown in Pennsylvania, in closed packages ready for distribution.

"Person" shall mean individuals, corporations, partnerships, and associations. The act, omission, or failure of any official or employe of any person, when such official or employe is acting within the scope of his employment or office, shall in every case be deemed also the act, omission, or failure of the person as well as of the official or employe.

Section 3. The provisions of these regulations shall not apply to apples in closed packages which are held, stored, or shipped to storage within the State, until same are packed for sale, offered or consigned for sale, or shipped for sale.

Section 4. Apples packed and branded in accordance with the United States Apple Grading Law, approved August 3, 1912, are exempt from the provisions of these regulations.

REGULATION 2—MARKING

Section 1. The following statements must appear upon all closed packages containing apples grown in the State of Pennsylvania:

(a) The name and address of the packer.

(b) The true name of the variety. If the true name of the variety is not known, the package should be marked "Variety Unknown."

(c) The minimum size or the numerical count of the apples in the closed package. When the minimum size is given,either the word "Minimum" or the abbreviation, "Min." must be used, together with the words or figures indicating the transverse diameter of the smallest fruit in the closed package.

(d) The capacity in terms of dry measure. Any recognized abbreviation may be used. There is no recognized abreviation for "standard."

Section 2. The marks hereinbefore provided for must appear upon the outside of one end of the closed package. Closed packages which can not be marked readily on an exposed end must be marked similarly in a conspicuous place. All such marks shall be branded or stenciled thereon in ink, or printed labels bearing such marks may be used. These marks must be in block letters and figures in type the size of thirty-six point Gothic or larger.

MINIMUM

Section 3. The following are samples of the markings, hereinbefore provided for, which must appear on all closed packages of apples grown in the State of Pennsylvania:

MIN. 2-INCH GRIMES
JOHN DOE, HARRISBURG, PA.
1 STANDARD BBL.

MINIMUM THREE-INCH
YORK IMPERIAL
JOHN DOE, HARRISBURG, PA.
ONE STANDARD BARREL

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138 (or other count)
WINESAP
(for box pack) JOHN DOE, HARRISBURG, PA.
ONE BUSHEL

Other marks which are in accordance with the facts, and which are not inconsistent with or do not in any way obscure the marks required by these regulations may be used.

Section 4. All apples grown in the State of Pennsylvania and packed in closed packages shall be so packed that the face or exposed surface shall fairly represent the average of the apples in the package. In determining such average, a representative quantity, equal in capacity, weight, or count to the quantity of apples on the exposed surface of the package, shall be selected as the average of the contents of the package. The apples in the exposed surface shall not excel the representative sample by more than fifteen per cent. in the matter of size and freedom from defects.

Section 5. Any person responsible for the repacking, within Pennsylvania, of closed packages of apples that were grown, packed, and branded in Pennsylvania, must erase or obliterate the name of the original packer. Such person shall then mark the closed package, "Repacked by," and shall use his own name and address. He shall make any other changes necessary in the marks upon the closed package in order to comply with these regulations.

Closed packages of apples not grown in Pennsylvania, shall not be packed or repacked, and marked in such a way as to indicate, or to appear upon ordinary observation, that the apples contained therein have been grown in Pennsylvania.

REGULATION 3—TOLERANCE

Not more than five per cent. of the total quantity of fruit within the closed package shall be below the size marked upon the package. This percentage of tolerance refers to the total quantity of all specimens failing to conform to the marks upon the package. This tolerance may be expressed or computed in terms of capacity, weight or actual count.

REGULATION 4—VIOLATIONS

Any person who shall pack for sale, ship for sale, offer or consign for sale, have in possession intended for sale, or sell, in closed packages, any apples grown in this State: (a) which are not packed and marked in accordance with the provisions of these regulations; (b) or which bear any false statement, design, or device regarding such apples, within the meaning of these regulations, shall be deemed guilty of a misdemeanor. Upon conviction, the violator shall be punished by a fine of not more than fifty dollars for the first offense, and not more than one hundred dollars for each subsequent offense.

However, no person shall be prosecuted who can establish by satisfactory evidence that no part of the packing or branding of the apples concerned was done by him, or under his authority, and that he had no knowledge that they were not packed in accordance with said provisions.

REGULATION 5—ENFORCEMENT

Any officers, employes, or agents of the Department of Agriculture of the Commonwealth of Pennsylvania are authorized to enter upon the premises of any person within this State for the purpose of purchasing packages of apples and securing evidence of violation of these regulations.

Approved:

FRED. RASMUSSEN,
Secretary of Agriculture.

June 1, 1920.

AN ACT

Regulating the packing of apples, providing penalties for violations, and imposing certain duties upon the Department of Agriculture.

Section 1. Be it enacted, &c., That every closed package containing apples grown in the State of Pennsylvania, which is sold, offered, or consigned for sale, packed for sale or shipped for sale, shall bear upon the outside of one end, in plain letters or figures, or both, the name and address of the person by whose authority the apples were packed, the true name of the variety therein contained, and the minimum size or numerical count of the fruit in the package: Provided, That packages which cannot readily be marked on an exposed end shall be similarly marked in a conspicuous place. If the true name of the variety is not known to the packer or the person by whose authority the apples are packed or branded, then such variety shall be designated as "unknown." Every package of apples which is repacked shall bear the name and address of the person by whose authority it is repacked, and shall be marked as prescribed by this act. The letters and figures used in marking closed packages of apples under the provisions of this act shall be of a size not less than thirty-six point Gothic.

Section 2. The marks prescribed by this act may be accompanied by any additional marks which are in accordance with the facts, and which are not inconsistent with or do not, in any way obscure the marks required by this act. Apples packed and branded in accordance with the United States Apple-Grading Law, approved August third, one thousand nine hundred and twelve, shall be exempt from the provisions of this act.

Section 3. All apples packed within the meaning of this act shall be so packed that the face or exposed surface shall fairly represent the average of the apples in the package. And it shall be considered a fair proposition if the face or exposed surface does not excel the average of the apples in the package by more than fifteen per centum in the matter of size and freedom from defects.

Section 4. The minimum size of the fruit in all grades shall be determined by taking the transverse diameter of the smallest fruit in the package. Minimum sizes shall be stated in variations of one-quarter of an inch; as, two inches, two and one-quarter inches, two and three-quarter inches, three inches, three and one-quarter inches, and so on, in accordance with the facts. Minimum sizes may be designated by either figures or words and the word "minimum" may be designated by the use of the abbreviation "min." A tolerance of five per centum in the matter of size shall be allowed.

Section 5. It shall be unlawful for any person to pack for sale, ship for sale, or offer or consign for sale, have in possession intended for sale, or sell in closed packages any apples grown in this State: (a) Which are not packed and marked in accordance with the provisions of this act and the regulations made hereunder; (b) or which bear any false statement, design, or device regarding such apples, within the meaning of this act.

Section 6. Any person who violates any of the provisions of this act shall be deemed guilty of a misdemeanor and upon conviction thereof, shall be punished by a fine of not more than fifty dollars for the first offense, and not more than one hundred dollars for each subsequent offense. No person shall be prosecuted under this act who can establish by satisfactory evidence that no part of the packing or branding of the apples concerned was done by him, or under his authority, and that he had no knowledge that they were not packed in accordance with said provisions. All penalties, costs, and fines collected under this act shall be paid to the Secretary of Agriculture, or his agent, and by him shall be paid into the State Treasury, for the use of the Commonwealth.

Section 7. The provisions of this act shall not apply to apples in closed packages which are held, stored, or shipped to storage within the State, until same are packed for sale, offered or consigned for sale, or shipped for sale.

Section 8. The word "person" as used herein shall be construed to include individuals, corporations, partnerships, and associations. The act, omission, or failure of any official or employe of any person, when such official or employe is acting within the scope of his employment or office, shall in every case be deemed also the act, omission, or failure of the person as well as of the official or employe. The words "closed package" shall mean a box, barrel, or other package, the contents of which can not be easily inspected when such package is closed.

Section 9. The enforcement of this act shall be vested in the State Department of Agriculture; and its officers, employes, and agents are authorized to enter upon the premises of any person within this State for the purpose of purchasing packages of apples and securing evidence of violation of this act; and the said Department of Agriculture is hereby authorized to make such rules and regulations as may be necessary for enforcing its provisions.

Section 10. This act shall take effect September first, one thousand nine hundred and seventeen.

Section 11. All acts and parts of acts inconsistent with this act are repealed.

Approved—The 24th day of May, A. D. 1917.

PROPOSED PENNSYLVANIA APPLE GRADES.

The Pennsylvania Apple Packing Law, which is now being enforced, requires each package of apples packed in Pennsylvania to have branded in some conspicuous place: The name and address of the packer, the true name of the variety, the minimum size (if box, the numerical count), and the capacity in terms of dry measure. The face or exposed surface shall fairly represent the average of the apples in the package.

This law does not include any requirements for grade, as do the State laws of New York, West Virginia, etc. Some tentative grades have been drawn up recently, and at the present time a number of representative growers are using and developing them. They are practically identical with the grades for barreled apples as proposed by the United States Bureau of Markets and Crop Estimates. Color requirements feature largely as a requisite in these grades which follow:

PENNSYLVANIA FANCY GRADE.

Pennsylvania Fancy Grade shall consist of hand-picked apples of one variety which are well-formed, uniform in size, firm and mature and which are free from decay, dirt, disease, bruises, insect or mechanical injury and other blemishes or defects, except those necessarily caused in proper packing. Apples of this grade shall be packed in clean, strong packages. Each apple shall have the amount of color hereinafter specified for apples of this grade.

In order to allow for variations properly incident to commercial grading and handling, not more than ten per cent by weight or numerical count of the apples in any package may be below the requirements of this grade.

PENNSYLVANIA "A" GRADE.

Pennsylvania A Grade shall consist of hand-picked apples of one variety which are firm and mature, which are free from decay and which are practically free from dirt, disease, bruises, insect or mechanical injury and other blemishes or defects, except those necessarily caused in proper packing. Each apple shall have the amount of color hereinafter specified for apples of this grade.

In order to allow for variations properly incident to commercial grading and handling, not more than ten per cent by weight or numerical count of the apples in any package may be below the requirements of this grade.

PENNSYLVANIA "B" GRADE.

Pennsylvania B Grade shall consist of hand-picked apples of one variety which are firm and mature, which are free from decay, wormholes and serious bruises and which are not materially deformed or materially discolored.

In order to allow for variations properly incident to commercial grading and handling, not more than ten per cent by weight or numerical count of the apples in any package may be below the requirements of this grade.

UNCLASSIFIED.

Any apples which do not conform to the foregoing specifications of grade, or if conforming, are not branded in accordance therewith, shall be marked "Unclassified."

COLOR REQUIREMENTS.

The following percentages refer to the amount of surface of each apple colored and **NOT** to the degree or intensity of color.

	Penna. Fancy	Penna. A	Penna. B
Solid Red Varieties			
Aiken Red Arkansas Black Baldwin Black Ben Davis Gano King David Red June Spitzenburg Winesap Other Solid Red Varieties	75%	25%	None required
Striped or Partial Red Varieties			
Alexander Arkansas Delicious Fameuse Jonathan King Lawver McIntosh Missouri Pippin Stayman Wealthy	50%	25%	None required
Ben Davis Geniton Northern Spy Oldenburg Rome Wagener Willow Twig York Imperial	50%	15%	None required
Gravenstein Jefferis Twenty Ounce Wolf River	25%	10%	None required

	Penna. Fancy	Penna. A	Penna. B
Red Cheeked or Blush Varieties			
Hyde King	Blushed Cheek	Tinge of color	None required
Maiden Blush			
Red Cheeked Pippin			
Winter Banana			
Other Red Cheeked or Blush Varieties			
Yellow or Green Varieties			
Rhode Island Greening	Characteristic color		None required
Albemarle Pippin			
Other Yellow or Green Varieties			

COMMERCIAL COLD STORAGE HOUSES IN PENNSYLVANIA.

THE SOUTHERN REGION.

Company	Location	Total Capacity Cu. Ft.	Amount Used For Fruits & Vegetables Cu. Ft.
Biglerville Cold Storage Co.,	Biglerville,	242,000	242,000
Chambersburg Ice & Cold Storage Co.,	Chambersburg,	250,000	230,000
Adams County Cold Storage Co.,	Gettysburg,	331,469	
J. A. Nicodemus Estate,	Waynesboro,	50,000	50,000

THE SOUTHEASTERN REGION.

Company	Location	Total Capacity Cu. Ft.	Amount Used For Fruits & Vegetables Cu. Ft.
Allentown Ice & Cold Storage Co.,	Allentown,	500,000	
Arbogast & Bastian Co.,	21 Hamilton St., Allentown,	493,159	
A. H. March Packing Co.,	Bridgeport,	129,500	
United Ice & Cold Storage Co.,	Harrisburg,	90,000	90,000
Swift & Co.,	7th & North Sts., Harrisburg,	221,276	
Mr. J. H. Kreamer,	6th & Forrest Ave., Harrisburg,	3,000	
Ralph Eckles,	144-148 S. Front St., Harrisburg,	2,030	
Charles Kunzler & Co.,	652 Manor St., Lancaster,	29,000	
Clement Allen,	Media, (Inactive)	7,500	
American Brewing Co.,	31st & Masters, Phila.	338,631	38,720
H. C. Darby & Co.,	425 Fairmount Ave., Phila.,	35,895	
Bernhard Ernst Bros.,	2920 N. 6th St., Phila.,	48,000	
Lotz Bros.,	1827 S. Front St., Phila.,	4,664	
W. A. Miller & Co.,	427 N. 2nd St., Phila.,	16,000	
Reading Terminal Market,	Phila.,	352,807	96,851
K. Seiler & Bros.,	4051 N. 5th St., Phila.,	13,860	
Standard Provision Co.,	212 N. Front St., Phila.,	15,602	15,602
F. G. Vogt & Son,	30th & Race Sts., Phila.,	252,396	
Mr. Thomas Bradley,	21st & Market, Phila.,	83,019	
Mr. Louis Burk,	3rd & Girard Ave., Phila.,	286,500	
Delaware Storage & Freezing Co.,	Phila.,	462,426	53,309
Edson Bros.,	110-112 Dock St., Phila.,	52,000	
John J. Felin & Co., Inc.,	4142-56 Germantown Ave., Phila.,	568,182	
George Hausmann & Sons Co.,	51st & Westminster Ave., Phila.,	23,520	

Company	Location	Total Capacity Cu. Ft.	Amount Used For Fruits & Vegetables Cu. Ft.
Industrial Cold Storage & Whse. Co.,	Phila.,	1,300,000	
Kingan Provision Co.,	Phila.,	76,464	
D. B. Martin Co.,	36th & Grays Ferry Road, Phila.,	365,754	
William Molands Sons,	158 Laurel St., Phila.,	46,260	
Pennsylvania Cold Storage & Market Co.,	Phila.,	1,250,000	1,250,000
G. F. Pfund & Sons,	3945 Germantown Ave., Phila.,	31,968	
Phila. Warehousing & Cold Storage Co.,	Phila.,	1,734,433	288,062
S. Sklaroff & Sons,	Phila.,	90,720	
Swift & Co.,	Girard Ave. Market, Phila.,	157,094	
Weiland Mfg. Co.,	551 Bridge St., Phoenixville,	43,230	
Pottstown Cold Storage & Whse. Co.,	Pottstown,	100,000	
Pottstown Abattoir,	Pottstown,	24,650	
Reading Abattoir Co.,	216-232 Pine St., Reading,	284,640	
Reading Cold Storage & Ice Co., (Keystone Plant)	Reading,	225,096	
Reading Cold Storage & Ice Co., (Reading Plant)	Reading,	124,904	
Lehigh Valley Cold Storage Co.,	South Bethlehem	300,000	75,000
H. J. Moffett Stores Co.,	Steelton,	69,132	
West Chester Cold Storage & Ice Co.,	West Chester,	6,600	6,600
Peoples Ice & Storage Co.,	West Chester,	48,846	27,000
York Storage & Ice Co.,	York,	143,452	136,060

NORTHEASTERN REGION.

Company	Location	Total Capacity Cu. Ft.	Amount Used For Fruits & Vegetables Cu. Ft.
Mr. Riley M. Judson,	Columbia Cross Roads,	10,000	
Wagner Bros.,	Frackville,	6,376	
Joseph Obert Co., Inc.,	Lehighton,	73,442	
L. W. Weissinger,	Mount Carmel,	48,740	
Jacob Ulmer Packing Co.,	Walnut & Railroad St., Pottsville,	295,283	
George Weissiner,	Pottsville,	33,778	
Seltzer Packing Co.,	Water St., Pottsville,	170,488	
Sayre Creamery & Cold Storage Co.,	Sayre	3,628	
Stower's Pork Packing & Provision Co.,	56 Green Lane, Scranton,	88,457	
Lackawanna Cold Storage Co.,	Scranton,	931.660	18,375
Croninger Packing Co.,	4th & Walnut Sts., Shamokin.	113,790	
Erb & Zaring,	Shamokin,	19,250	2,700
Shenandoah Abattoir Co.,	Poplar & Market Sts. ,Shenandoah,	65,110	
F. W. Kellner,	Tamaqua,	31,680	

CENTRAL REGION.

Company	Location	Total Capacity Cu. Ft.	Amount Used For Fruits & Vegetables Cu. Ft.
Storage Ice & Supply Co., Indiana,		57,980	10,600
The C. A. Young Co., Mathews St., Jamestown,		33,701	
Edward Hahn Packing House, Hickory St. & B. & O., Johnstown,		54,185	
Keystone Butter Co., Johnstown,		15,000	
Punxsutawney Beef & Provision Co., Punxsutawney,		38,636	
Smith & Horton Co., Ltd., Warren,		6,270	
John Peters, 1320 E. 5th St., Williamsport,		30,000	

WESTERN REGION.

Brownsville Ice & Cold Storage Co., Brownsville,		57,300	
Rider Bros., Cambridge Springs,		13,577	
The Abott Packing Co., Carnegie,		95,000	
Bracken Bros., Corry,		20,880	
Schaffner Bros. Co., Erie,		30,000	
Schlaudecker Bros., 929 State St., Erie,		6,538	
Lake Erie Fish Co., Erie,		3,312	
Booth Fisheries, Erie,		15,900	
Keystone Fish Co., French St., Erie,		40,500	
Kolbe Fish Co., Erie,		21,695	
Lake Shore Ice Cream & Cold Storage Co., Erie,		38,542	4,708
Eugene Loesch & Son, Erie,		8,100	
Union Fish Co., Erie,		15,960	
George W. Boyd Co., Farrell,		93,000	
Mr. J. W. Rice, Harmonsburg,		8,000	
The Peters Packing Co., 922 Rose St., McKeesport,		136,257	
Monessen Pure Ice Co., Monessen,		35,000	35,000
The Frank J. Kuhn Co., Inc., 2108 East St., Pittsburgh,		12,136	
Sun Packing Co., 1912 Spring Garden Ave., Pittsburgh,		67,200	
Swift & Co., 309 Anderson St., Pittsburgh,		116,728	
J. M. Denholm Bros. Co., Pittsburgh,		136,055	
Dunlevy Packing Co., Hamilton Ave. & Enterprise, Pittsburgh,		399,100	
Fried & Reinman Packing Co., 1314 Spring Garden Ave., Pittsburgh,		161,322	
Pittsburgh Provision & Packing Co., Pittsburgh,		1,236,481	

Company	Location	Total Capacity Cu. Ft.	Amount Used For Fruits & Vegetables Cu. Ft.
Pittsburgh Terminal Whse. & Trf. Co.,	Pittsburgh,	657,919	22,484
Standard Ice Co.,	Pittsburgh,	368,680	33,680
Union Storage Co.,	Pittsburgh,	537,148	51,296
Wm. Zoller Co., 343 Spring Garden Ave.,	Pittsburgh,	476,365	
Hygeia Co.,	Uniontown,	110,000	
TOTALS FOR THE STATE		18,382,628	2,743,647

NOTE: 15% of the total storage space is given over to Fruits and Vegetables, consisting in most cases of apples.

LIST OF PENNSYLVANIA BY-PRODUCT PLANTS.

ADAMS COUNTY

Adams County Preserving Company, York Springs, Pa.	C
Aspers Fruit Products Co., Aspers, Pa.	C
Burgoon & Yingling, Gettysburg, Pa.	C P
W. S. Adams, Gardners, Pa.	C S
W. E. Grove, York Springs, Pa.	S
Musselman Canning Co., Biglerville, Pa.	C P
Orrtanna Canning Co., Orrtanna, Pa.	C S
York Springs Canning Co., York Springs, Pa.	C S

ALLEGHENY COUNTY

H. N. Crosby Co., Inc., 1119 Bidwell St., N. S., Pgh., Pa.	S V
Cruikshank Bros., Co., Preble & Island Ave., N. S. Pgh., Pa.	AB
Vernon D. Price Co., Allegheny Ave., Pittsburg, Pa.	S V
West Penn Vinegar Co., Merchant & Martindale Sts., N. S. Pgh.	C
H. J. Heinz Co., 1062 Maine St., N. S. Pittsburgh, Pa.	C S V P
Peerless Food Mfg. Co., 55 S. 17th St., Pittsburgh, Pa.	V

BERKS COUNTY

The Shearer Fruit & Poultry Farms, Vinemont, Pa.	S V

BRADFORD COUNTY

Miller Canning Co., Monroeton, Pa.	C P
Belmar Mfg. Co., Canton, Pa.	AB

BUTLER COUNTY

C. M. Hilliard, West Sunbury, Pa.	C P

BUCKS COUNTY

G. Bochringer, Newportville, Pa.	S V

CRAWFORD COUNTY

Altshulter Bros. & Co., Springboro, Pa.	S V

DELAWARE COUNTY

Morton Canning Co., Morton, Pa.	

ERIE COUNTY

Girard Canning Co., North Girard, Pa.	C
North East Cider Works, North East, Pa.	S

Welsh Grape Juice Co., North East, Pa.	S
Stittville Canning Co., Inc., North East, Pa.	C P
Grimshaw Bros., North East, Pa.	S V

FRANKLIN COUNTY

Renfrew Packing Co., Fayetteville, Pa.	C
Diehl, Omwake & Diehl, Chambersburg, Pa.	E

LANCASTER COUNTY

Lancaster Vinegar Co., Lancaster, Pa.	V

LACKAWANNA COUNTY

Maloney Oil & Mfg. Co., Scranton, Pa.	S V

LUZERNE COUNTY

Jenkins-Kirby Packing Co., Wilkes-Barre, Pa.	S V

MONTGOMERY COUNTY

William E. Morris, Lansdale, Pa.	C P

MONROE COUNTY

Kistler Vinegar Works, Stroudsburg, Pa.	S V

NORTHUMBERLAND COUNTY

Shamokin Pure Food Products Co., Shamokin, Pa.	

PERRY COUNTY

J. B. Foos, Elliotsburg, Pa.	S V

PHILADELPHIA COUNTY

Moore & Sons, 110 Hastler St., Philadelphia, Pa.	M
Erdmann Vinegar Co., 1808 Franklin Ave., Phila, Pa.,	S
American Preserve Co., Inc., Philadelphia, Pa.	M AB
Powell Corp., 1523 S. Front St., Philadelphia, Pa.	V
Weinfeld & Sons, Philadelphia, Pa.	V
Philip Ritter Conserve Co., Philadelphia, Pa.	AB
Quaker City Pure Fruit & Preserve Co., Philadelphia, Pa.	AB
Phila. Vinegar Co., 1523 Front St., Philadelphia, Pa.	V

YORK COUNTY

P. H. Hershey, Spring Grove, Pa.	C
George W. Develbiss, Stewartstown, Pa.	C
Codorus Canning Co., Codorus, Pa.	C

Flinchbaugh & Leber, Red Lion, Pa.	C
R. B. Hyson, Bridgeton, Pa.	C
D. E. Winebrenner Co., Hanover, Pa.	
James T. Smith, Fawn Grove, Pa.	C
High Rock Canning Co., High Rock, Pa.	C
Farmers' Canning Co., Red Lion, Pa.	C P
D. F. Gipe & Co., Red Lion, Pa.	C P

C — Canning
V — Vinegar
S — Cider
AB — Apple butter
M — Mince meat
P — Preserves
E — Evaporator